Package ‘PanelCount’

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Title Random Effects and/or Sample Selection Models for Panel Count Data
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Description A high performance package implementing random effects and/or sample selection models for panel count data.
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R topics documented:

CRE ......................................................... 2
CRE_SS ................................................. 3
PanelCount ............................................. 5
PLN_RE .................................................... 6
PoissonRE .................................................. 7
ProbitRE .................................................... 8
rt ......................................................... 9

Index 11
**A Model with Correlated Random Effects in Poisson and Probit Equations**

**Description**

Estimate a model in panel counting data, in which the selection equation is a Probit model with random effects on individuals, and the outcome equation is a Poisson model with random effects on the same individuals. The random effects on the same individual are correlated across two equations.

**Usage**

CRE(sel_form, out_form, id, data = NULL, par = NULL, par_files = NULL, delta = 1, max_delta = 3, sigma = 1, max_sigma = 3, rho = 0, lower = c(rho = -1), upper = c(rho = 1), method = "L-BFGS-B", H = c(10, 10), psnH = 20, prbH = 20, accu = 10000, reltol = 1e-08, verbose = 0, tol_gtHg = Inf)

**Arguments**

- **sel_form**: Formula for selection equation, a probit model with random effects
- **out_form**: Formula for outcome equation, a Poisson model with random effects
- **id**: A vector that represents the identity of individuals, numeric or character
- **data**: Input data, a data frame
- **par**: Starting values for estimates
- **par_files**: Loading initial values from saved ProbitRE and PoissonRE estimates
- **delta**: Variance of random effects in Probit model
- **max_delta**: Largest allowed initial delta
- **sigma**: Variance of random effects in Poisson model
- **max_sigma**: Largest allowed initial sigma
- **rho**: Correlation between random effects in Probit and Poisson models
- **lower**: Lower bound for estimates
- **upper**: Upper bound for estimates
- **method**: Searching algorithm, don’t change default unless you know what you are doing
- **H**: A vector of length 2, specifying the number of points for inner and outer Quadratures
- **psnH**: Number of Quadrature points for Poisson RE model
- **prbH**: Number of Quadrature points for Probit RE model
- **accu**: L-BFGS-B only, 1e12 for low accuracy; 1e7 for moderate accuracy; 10.0 for extremely high accuracy. See optim
- **reltol**: Relative convergence tolerance. default typically 1e-8
- **verbose**: Level of output during estimation. Lowest is 0.
- **tol_gtHg**: tolerance on gtHg, not informative for L-BFGS-B
Value

A list containing the results of the estimated model

References


See Also

Other PanelCount: CRE_SS; PLN_RE; PoissonRE; ProbitRE

Examples

data(rt)
# Note: estimation may take 2-3 minutes
est = CRE(isRetweet=fans+tweets+as.factor(tweet.id),
num.words=fans+tweets+as.factor(tweet.id),
id=rt$user.id, data=rt)

Description

Estimate a sample selection model in panel counting data, in which the selection equation is a Probit model with random effects on individuals, and the outcome equation is a Poisson Lognormal model with random effects on the same individuals. The random effects on the same individual and the error terms on the same <individual, time> dyad are both correlated across two equations.

Usage

CRE_SS(sel_form, out_form, id, data = NULL, par = NULL, killed_par = NULL,
par_files = NULL, delta = 1, sigma = 1, gamma = 1, max_delta = 3,
max_sigma = 3, max_gamma = 5, rho = 0, tau = 0, lower = c(rho = -1,
tau = -1), upper = c(rho = 1, tau = 1), method = "L-BFGS-B", H = c(10,
10), psnH = 20, prbH = 20, plnreH = 20, accu = 10000,
reltol = sqrt(.Machine$double.eps), verbose = 0, tol_gthg = Inf)
Arguments

- **sel_form**: Formula for selection equation, a probit model with random effects
- **out_form**: Formula for outcome equation, a Poisson model with random effects
- **id**: A vector that represents the identity of individuals, numeric or character
- **data**: Input data, a data frame
- **par**: Starting values for estimates
- **killed_par**: correlation parameters to switch off
- **par_files**: Loading initial values from saved ProbitRE and PoissonRE estimates
- **delta**: Variance of random effects on the individual level for ProbitRE
- **sigma**: Variance of random effects on the individual level for PLN_RE
- **gamma**: Variance of random effects on the <individual, time> level for PLN_RE
- **max_delta**: Largest allowed initial delta
- **max_sigma**: Largest allowed initial sigma
- **max_gamma**: Largest allowed initial gamma
- **rho**: Correlation between random effects on the individual level
- **tau**: Correlation between error terms on the <individual, time> level
- **lower**: Lower bound for estimates
- **upper**: Upper bound for estimates
- **method**: Searching algorithm, don't change default unless you know what you are doing
- **H**: A vector of length 2, specifying the number of points for inner and outer Quadratures
- **psnH**: Number of Quadrature points for Poisson RE model
- **prbH**: Number of Quadrature points for Probit RE model
- **plnreh**: Number of Quadrature points for PLN_RE model
- **accu**: L-BFGS-B only, 1e12 for low accuracy; 1e7 for moderate accuracy; 10.0 for extremely high accuracy. See optim
- **reltol**: Relative convergence tolerance. default typically 1e-8
- **verbose**: Level of output during estimation. Lowest is 0.
- **tol_gtHg**: tolerance on gtHg, not informative for L-BFGS-B

Value

A list containing the results of the estimated model

References

PanelCount

See Also

Other PanelCount: CRE; PLN_RE; PoissonRE; ProbitRE

Examples

data(rt)
# Note: estimation may take up 10-15 minutes
est = CRE_SS(isRetweet~fans+tweets+as.factor(tweet.id),
              num.words~fans+tweets+as.factor(tweet.id),
              id=rt$user.id, data=rt)

Description

A high performance package for estimating counting models with random effects and sample selection in panel counting data, namely counting data with repeated observations on individuals over time.

Functions

ProbitRE: Probit model with random effects on individuals

PoissonRE: Poisson model with random effects on individuals

PLN_RE: Poisson Lognormal model with random effects on individuals

CRE: PoissonRE and ProbitRE model with correlated random effects on individuals

CRE_SS: PLN_RE and ProbitRE model with correlated random effects on individual level and correlated error terms on <individual, time> level

References


Description

Estimate a Poisson Lognormal model with random effects in panel counting data. This model accounts for heterogeneity on the individual level, and heterogeneity on the <individual, time> level.

Usage

```r
PLN_RE(formula, id, data = NULL, par = NULL, gamma = 1, max.gamma = 5,
       sigma = 1, max.sigma = 3, method = "BFGS", lower = NULL,
       upper = NULL, H = 20, psnH = 20, accu = 10, reltol = 1e-08,
       verbose = 0, tol_gtHg = Inf)
```

Arguments

- `formula`: Formula of the model
- `id`: A vector that represents the identity of individuals, numeric or character
- `data`: Input data, a data frame
- `par`: Starting values for estimates
- `gamma`: Variance of random effects on the <individual, time> level for PLN_RE
- `max.gamma`: Largest allowed initial gamma
- `sigma`: Variance of random effects on the individual level for PLN_RE
- `max.sigma`: Largest allowed initial sigma
- `method`: Searching algorithm, don’t change default unless you know what you are doing
- `lower`: Lower bound for estimates
- `upper`: Upper bound for estimates
- `H`: A vector of length 2, specifying the number of points for inner and outer Quadratures
- `psnH`: Number of Quadrature points for Poisson RE model
- `accu`: L-BFGS-B only, 1e12 for low accuracy; 1e7 for moderate accuracy; 10.0 for extremely high accuracy. See optim
- `reltol`: Relative convergence tolerance. default typically 1e-8
- `verbose`: Level of output during estimation. Lowest is 0.
- `tol_gtHg`: tolerance on gtHg, not informative for L-BFGS-B

Value

A list containing the results of the estimated model
References


See Also

Other PanelCount: CRE_SS; CRE; PoissonRE; ProbitRE

Examples

data(rt)
est = PLN_RE(num.words~fans+tweets+as.factor(tweet.id),
id=r$t$user.id[r$t$isRetweet==1],
data=r[t$r$isRetweet==1,])

Description

Estimate a Poisson model with random effects in panel counting data. Note this model is different with the Poisson Lognormal model for counting data.

Usage

PoissonRE(formula, id, data = NULL, par = NULL, sigma = 1,
max_sigma = 3, method = "BFGS", lower = NULL, upper = NULL, H = 20,
accu = 10, reltol = 1e-08, verbose = 0, tol_gthg = Inf)

Arguments

formula Formula of the model
id A vector that represents the identity of individuals, numeric or character
data Input data, a data frame
par Starting values for estimates
sigma Variance of random effects on the individual level
max_sigma Largest allowed initial sigma
method Searching algorithm, don’t change default unless you know what you are doing
lower Lower bound for estimates
upper Upper bound for estimates
ProbitRE

A vector of length 2, specifying the number of points for inner and outer Quadratures

accu  
L-BFGS-B only. 1e12 for low accuracy; 1e7 for moderate accuracy; 10.0 for extremely high accuracy. See optim

reltol  
Relative convergence tolerance. default typically 1e-8

verbose  
Level of output during estimation. Lowest is 0.

tol_gtHg  
tolerance on gtHg, not informative for L-BFGS-B

Value

A list containing the results of the estimated model

See Also

Other PanelCount: CRE_SS; CRE; PLN_RE; ProbitRE

Examples

```r
data(rt)
est = PoissonRE(num.words=fans+tweets+as.factor(tweet.id),
    id=rt$user.id[rt$isRetweet==1],
    data=rt[rt$isRetweet==1,])
```

---

ProbitRE  
A Probit Model with Random Effects

Description

Estimate a Probit model with random effects

Usage

ProbitRE(formula, id, data = NULL, delta = 1, max_delta = 3,
    method = "BFGS", lower = NULL, upper = NULL, H = 20, accu = 10,
    reltol = 1e-08, verbose = 0, tol_gtHg = Inf)

Arguments

formula  
Formula of the model

id  
A vector that represents the identity of individuals, numeric or character

data  
Input data, a data frame

delta  
Variance of random effects on the individual level for ProbitRE

max_delta  
Largest allowed initial delta

method  
Searching algorithm, don’t change default unless you know what you are doing
lower  Lower bound for estimates
upper  Upper bound for estimates
H      A vector of length 2, specifying the number of points for inner and outer Quadratures
accu   L-BFGS-B only, 1e12 for low accuracy; 1e7 for moderate accuracy; 10.0 for extremely high accuracy. See optim
reltol Relative convergence tolerance. default typically 1e-8
verbose Level of output during estimation. Lowest is 0.
tol_gtHg tolerance on gtHg, not informative for L-BFGS-B

Value
A list containing the results of the estimated model

See Also
Other PanelCount: CRE_SS; CRE; PLN_RE; PoissonRE

Examples

```
data(rt)
est = ProbitRE(isRetweet=fans+tweets+as.factor(tweet.id),
               id=rt$user.id, data=rt)
```

rt Number of words in quoted retweets

Description
A anonymized dataset containing the retweeting activities of 894 microblog users on 15 tweets

Usage
rt

Format
A data frame 13410 rows and 6 columns
tweet.id  The id of a status posted on microblog
user.id  The id of a user on microblog
fans  The number of fans of the user, on the log scale
tweets  The number of tweets of the user, on the log scale
isRetweet  Whether the user retweets the given tweet, boolean
num.words  Number of words attached while retweeting. NA if doesn’t retweet
Source

collected by the author of the package on microblog
Index

*Topic datasets
  rt, 9

CRE, 2, 5, 7–9
CRE_SS, 3, 3, 7–9

PanelCount, 5
PanelCount-package (PanelCount), 5
PLN_RE, 3, 5, 6, 8, 9
PoissonRE, 3, 5, 7, 7, 9
ProbitRE, 3, 5, 7, 8, 8

rt, 9