Package 'PanelCount'

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Type Package

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.

License GPL (>= 3)

LazyData TRUE

Depends R (>= 3.0.0)

Imports Rcpp, statmod

LinkingTo Rcpp, RcppArmadillo

NeedsCompilation yes

Repository CRAN

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R topics documented:

CRE *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 estiamtes
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 Quddrature 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

1. Jing Peng and Christophe Van den Bulte. Participation vs. Effectiveness of Paid Endorsers in Social Advertising Campaigns: A Field Experiment. Working Paper.

2. Jing Peng and Christophe Van den Bulte. How to Better Target and Incent Paid Endorsers in Social Advertising Campaigns: A Field Experiment. In Proceedings of the 2015 International Conference on Information Systems.

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)
```

CRE_SS *A Sample Selection Model with Correlated Random Effects*

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 swtich 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 estiamtes
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 Quddrature points for Probit RE model
plnreH	Number of Quddrature 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

1. Jing Peng and Christophe Van den Bulte. Participation vs. Effectiveness of Paid Endorsers in Social Advertising Campaigns: A Field Experiment. Working Paper.

2. Jing Peng and Christophe Van den Bulte. How to Better Target and Incent Paid Endorsers in Social Advertising Campaigns: A Field Experiment. In Proceedings of the 2015 International Conference on Information Systems.

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)
```

PanelCount *Random Effects and Sample Selection Models for Panel Counting Data*

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

1. Jing Peng and Christophe Van den Bulte. Participation vs. Effectiveness of Paid Endorsers in Social Advertising Campaigns: A Field Experiment. Working Paper.

2. Jing Peng and Christophe Van den Bulte. How to Better Target and Incent Paid Endorsers in Social Advertising Campaigns: A Field Experiment. In Proceedings of the 2015 International Conference on Information Systems.

PLN_RE *A Poisson Lognormal Model with Random Effects*

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

```
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 estiamtes
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

1. Jing Peng and Christophe Van den Bulte. Participation vs. Effectiveness of Paid Endorsers in Social Advertising Campaigns: A Field Experiment. Working Paper.

2. Jing Peng and Christophe Van den Bulte. How to Better Target and Incent Paid Endorsers in Social Advertising Campaigns: A Field Experiment. In Proceedings of the 2015 International Conference on Information Systems.

See Also

Other PanelCount: CRE_SS; CRE; PoissonRE; ProbitRE

Examples

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

PoissonRE *A Poisson Model with Random Effects*

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 estiamtes
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; ProbitRE

Examples

```
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 estiamtes
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

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