

Package ‘iccbeta’

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Type Package

Title Multilevel model intraclass correlation for slope heterogeneity

Version 1.0

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Maintainer Steven Andrew Culpepper <sculpepp@illinois.edu>

Description A function and vignettes for computing an intraclass correlation described in Aguinis & Culpepper (in press). iccbeta quantifies the share of variance in a dependent variable that is attributed to group heterogeneity in slopes.

License GPL (>= 2)

Imports Rcpp (>= 0.11.1)

LinkingTo Rcpp (>= 0.11.1), RcppArmadillo

Depends R (>= 3.0.2), lme4

Author Steven Andrew Culpepper [aut, cph, cre],
Herman Aguinis [aut, cph]

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iccbeta-package	<i>Intraclass correlation used to assess variability of lower-order relationships across higher-order processes/units.</i>
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Description

A function and vignettes for computing the intraclass correlation described in Aguinis & Culpepper (in press). iccbeta quantifies the share of variance in an outcome variable that is attributed to heterogeneity in slopes due to higher-order processes/units.

Details

Package:	iccbeta
Type:	Package
Version:	1.0
Date:	2014-11-21
License:	GPL (>= 2)

Author(s)

Steven Andrew Culpepper, Herman Aguinis

Maintainer: Steven Andrew Culpepper <sculpepp@illinois.edu>

References

Aguinis, H., & Culpepper, S.A. (in press). An expanded decision making procedure for examining cross-level interaction effects with multilevel modeling. *Organizational Research Methods*. Available at: <http://mypage.iu.edu/~haguinis/pubs.html>

Examples

```
## Not run:
#Simulated Data Example
data(simICCdata)
require(lme4)

#computing icca
vy = var(simICCdata$Y)
lmm0 <- lmer(Y ~ (1|l2id), data=simICCdata, REML=F)
VarCorr(lmm0)$l2id[1,1]/vy

#Estimating random slopes model
lmm1 <- lmer(Y~I(X1-m_X1)+I(X2-m_X2) +(I(X1-m_X1)+I(X2-m_X2)|l2id), data=simICCdata2, REML=F)
X = model.matrix(lmm1)
```

```

p=ncol(X)
T1 = VarCorr(lmm1) $l2id[1:p,1:p]
#computing iccb
#Notice '+1' because icc_beta assumes l2ids are from 1 to 30.
icc_beta(X,simICCdata2$l2id+1,T1,vy)$rho_beta

#Hofmann 2000 Example
data(Hofmann)
require(lme4)

#Random-Intercepts Model
lmmHofmann0 = lmer(helping ~ (1|id),data=Hofmann)
vy_Hofmann = var(Hofmann[, 'helping'])
#computing icca
VarCorr(lmmHofmann0)$id[1,1]/vy_Hofmann

#Estimating Group-Mean Centered Random Slopes Model, no level 2 variables
lmmHofmann1 <- lmer(helping ~ mood_grp_cent + (mood_grp_cent |id),data=Hofmann,REML=F)
X_Hofmann = model.matrix(lmmHofmann1)
P = ncol(X_Hofmann)
T1_Hofmann = VarCorr(lmmHofmann1)$id[1:P,1:P]
#computing iccb
icc_beta(X_Hofmann,Hofmann[, 'id'],T1_Hofmann,vy_Hofmann)$rho_beta

#Performing LR test
library('RLRsim')
lmmHofmann1a <- lmer(helping ~ mood_grp_cent + (1 |id),data=Hofmann,REML=F)
obs.LRT <- 2*(logLik(lmmHofmann1)-logLik(lmmHofmann1a))[1]
X <- getME(lmmHofmann1,"X")
Z <- t(as.matrix(getME(lmmHofmann1,"Zt")))
sim.LRT <- LRsim(X, Z, 0, diag(ncol(Z)))
(pval <- mean(sim.LRT > obs.LRT))

## End(Not run)

```

Hofmann

A multilevel dataset from Hofmann, Griffin, and Gavin (2000).

Description

A multilevel dataset from Hofmann, Griffin, and Gavin (2000).

Usage

```
data(Hofmann)
```

Format

A data frame with 1,000 observations and 7 variables.

id a numeric vector of group ids.
 helping a numeric vector of the helping outcome variable construct.
 mood a level 1 mood predictor.
 mood_grp_mn a level 2 variable of the group mean of mood.
 cohesion a level 2 covariate measuring cohesion.
 mood_grp_cent group-mean centered mood predictor.
 mood_grd_cent grand-mean centered mood predictor.

Author(s)

Steven Andrew Culpepper, Herman Aguinis
 Maintainer: Steven Andrew Culpepper <sculpepp@illinois.edu>

Source

Hofmann, D.A., Griffin, M.A., & Gavin, M.B. (2000). The application of hierarchical linear modeling to management research. In K.J. Klein, & S.W.J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 467-511). Hoboken, NJ: Jossey-Bass.

References

Aguinis, H., & Culpepper, S.A. (in press). An expanded decision making procedure for examining cross-level interaction effects with multilevel modeling. *Organizational Research Methods*. Available at: <http://mypage.iu.edu/~haguinis/pubs.html>

See Also

[lmer](#), [model.matrix](#), [VarCorr](#), [LRTsim](#), [simICCdata](#)

Examples

```
## Not run:
data(Hofmann)
require(lme4)

#Random-Intercepts Model
lmmHofmann0 = lmer(helping ~ (1|id),data=Hofmann)
vy_Hofmann = var(Hofmann[, 'helping'])
#computing icca
VarCorr(lmmHofmann0)$id[1,1]/vy_Hofmann

#Estimating Group-Mean Centered Random Slopes Model, no level 2 variables
lmmHofmann1 <- lmer(helping ~ mood_grp_cent + (mood_grp_cent |id),data=Hofmann,REML=F)
X_Hofmann = model.matrix(lmmHofmann1)
P = ncol(X_Hofmann)
T1_Hofmann = VarCorr(lmmHofmann1)$id[1:P,1:P]
#computing iccb
icc_beta(X_Hofmann,Hofmann[, 'id'],T1_Hofmann,vy_Hofmann)$rho_beta
```

```

#Performing LR test
#Need to install 'RLRsim' package
library('RLRsim')
lmmHofmann1a <- lmer(helping ~ mood_grp_cent + (1 |id),data=Hofmann,REML=F)
obs.LRT <- 2*(logLik(lmmHofmann1)-logLik(lmmHofmann1a))[1]
X <- getME(lmmHofmann1,"X")
Z <- t(as.matrix(getME(lmmHofmann1,"Zt")))
sim.LRT <- LRsim(X, Z, 0, diag(ncol(Z)))
(pval <- mean(sim.LRT > obs.LRT))

## End(Not run)

```

icc_beta	<i>Intraclass correlation used to assess variability of lower-order relationships across higher-order processes/units.</i>
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Description

A function and vignettes for computing the intraclass correlation described in Aguinis & Culpepper (in press). iccbeta quantifies the share of variance in an outcome variable that is attributed to heterogeneity in slopes due to higher-order processes/units.

Usage

```
icc_beta(X, l2id, T, vy)
```

Arguments

X	The design matrix of fixed effects from a lmer model.
l2id	A vector that identifies group membership. The vector must be coded as a sequence of integers from 1 to J, the number of groups.
T	A matrix of the estimated variance-covariance matrix of a lmer model fit.
vy	The variance of the outcome variable.

Author(s)

Steven Andrew Culpepper, Herman Aguinis

Maintainer: Steven Andrew Culpepper <sculpepp@illinois.edu>

References

Aguinis, H., & Culpepper, S.A. (in press). An expanded decision making procedure for examining cross-level interaction effects with multilevel modeling. *Organizational Research Methods*. Available at: <http://mypage.iu.edu/~haguinis/pubs.html>

See Also

[lmer](#), [model.matrix](#), [VarCorr](#), [LRTsim](#), [Hofmann](#), [simICCdata](#)

Examples

```
## Not run:
#Simulated Data Example from Aguinis & Culpepper (in press)
data(simICCdata)
require(lme4)

#computing icca
vy = var(simICCdata$Y)
lmm0 <- lmer(Y ~ (1||l2id),data=simICCdata,REML=F)
VarCorr(lmm0)$l2id[1,1]/vy

#Estimating random slopes model
lmm1 <- lmer(Y~I(X1-m_X1)+I(X2-m_X2) +(I(X1-m_X1)+I(X2-m_X2)||l2id),data=simICCdata2,REML=F)
X = model.matrix(lmm1)
p=ncol(X)
T1 = VarCorr(lmm1) $l2id[1:p,1:p]
#computing iccb
#Notice '+1' because icc_beta assumes l2ids are from 1 to 30.
icc_beta(X,simICCdata2$l2id+1,T1,vy)$rho_beta

#Hofmann et al. (2000) Example
data(Hofmann)
require(lme4)

#Random-Intercepts Model
lmmHofmann0 = lmer(helping ~ (1|id),data=Hofmann)
vy_Hofmann = var(Hofmann[, 'helping'])
#computing icca
VarCorr(lmmHofmann0)$id[1,1]/vy_Hofmann

#Estimating Group-Mean Centered Random Slopes Model, no level 2 variables
lmmHofmann1 <- lmer(helping ~ mood_grp_cent + (mood_grp_cent |id),data=Hofmann,REML=F)
X_Hofmann = model.matrix(lmmHofmann1)
P = ncol(X_Hofmann)
T1_Hofmann = VarCorr(lmmHofmann1)$id[1:P,1:P]
#computing iccb
icc_beta(X_Hofmann,Hofmann[, 'id'],T1_Hofmann,vy_Hofmann)$rho_beta

#Performing LR test
library('RLRsim')
lmmHofmann1a <- lmer(helping ~ mood_grp_cent + (1 |id),data=Hofmann,REML=F)
obs.LRT <- 2*(logLik(lmmHofmann1)-logLik(lmmHofmann1a))[1]
X <- getME(lmmHofmann1,"X")
Z <- t(as.matrix(getME(lmmHofmann1,"Zt")))
sim.LRT <- LRTsim(X, Z, 0, diag(ncol(Z)))
(pval <- mean(sim.LRT > obs.LRT))

## End(Not run)
```

`simICCdata`*Simulated data example from Aguinis and Culpepper (in press).*

Description

A simulated data example from Aguinis and Culpepper (in press) to demonstrate the `icc_beta` function for computing the proportion of variance in the outcome variable that is attributed to heterogeneity in slopes due to higher-order processes/units.

Usage

```
data(simICCdata)
```

Format

A data frame with 900 observations (i.e., 30 observations nested within 30 groups) on the following 6 variables.

`l1id` A within group ID variable.

`l2id` A group ID variable.

`one` A column of 1's for the intercept.

`X1` A simulated level 1 predictor.

`X2` A simulated level 1 predictor.

`Y` A simulated outcome variable.

Details

See Aguinis and Culpepper (in press) for the model used to simulate the dataset.

Author(s)

Steven Andrew Culpepper, Herman Aguinis

Maintainer: Steven Andrew Culpepper <sculpepp@illinois.edu>

Source

Aguinis, H., & Culpepper, S.A. (in press). An expanded decision making procedure for examining cross-level interaction effects with multilevel modeling. *Organizational Research Methods*. Available at: <http://mypage.iu.edu/~haguinis/pubs.html>

See Also

[lmer](#), [model.matrix](#), [VarCorr](#), [LRTSim](#), [Hofmann](#)

Examples

```
## Not run:
data(simICCdata)
require(lme4)

#computing icca
vy = var(simICCdata$Y)
lmm0 <- lmer(Y ~ (1|l2id),data=simICCdata,REML=F)
VarCorr(lmm0)$l2id[1,1]/vy

#Estimating random slopes model
lmm1 <- lmer(Y~I(X1-m_X1)+I(X2-m_X2) +(I(X1-m_X1)+I(X2-m_X2)|l2id),data=simICCdata2,REML=F)
X = model.matrix(lmm1)
p=ncol(X)
T1 = VarCorr(lmm1) $l2id[1:p,1:p]
#computing iccb
#Notice '+1' because icc_beta assumes l2ids are from 1 to 30.
icc_beta(X,simICCdata2$l2id+1,T1,vy)$rho_beta

## End(Not run)
```

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