Package 'iccbeta'

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Type Package

Title Multilevel model intraclass correlation for slope heterogeneity

Version 1.0

Date 2014-11-21

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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

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iccbeta-package *Intraclass correlation used to assess variability of lower-order relationships across higher-order processes/units.*

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
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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 <- LRTSim(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)

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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 <- LRTSim(X, Z, 0, diag(ncol(Z)))
  (pval <- mean(sim.LRT > obs.LRT))

## End(Not run)
```

`icc_beta` *Intraclass correlation used to assess variability of lower-order relationships across higher-order processes/units.*

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)

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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)

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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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