Package 'vICC'

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Type Package

Title Varying Intraclass Correlation Coefficients

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Description Compute group-specific intraclass correlation coefficients, Bayesian testing of homogenous within-group variance, and spike-and-slab model selection to determine which groups share a common within-group variance in a one-way random effects model <10.31234/osf.io/hpq7w>.

License GPL-2

Depends R (>= 4.0.0)

Imports coda (>= 0.19-4), ggplot2, methods, nlme, Rdpack (>= 0.11-1), rjags (>= 4-10)

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

RdMacros Rdpack

BugReports https://github.com/donaldRwilliams/vICC/issues

NeedsCompilation no

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R topics documented:

`change_group` *Change Group ID*

Description

Change the group ID to be consequetive numbers, starting at 1, which is required for model fitting.

Usage

```
change_group(group)
```

Arguments

`group`	Numeric Vector. The grouping variable (e.g., subjects).

Value

Updated group ID.

Examples

```
# congruent trials
dat <- subset(flanker,  id %in% c(39, 23, 2))
change_group(dat$id)
```

`coef.vicc` *Extract the Group-Specific Coefficients*

Description

Extract the group-specific coefficients (fixed effect + random effect).

Usage

```
## S3 method for class 'vicc'
coef(object, cred = 0.9, ...)
```

Arguments

object	An object of class vicc
cred	Numeric. Credible interval width (defaults to 0.90).
...	Currently ignored.

Value

An array with the summarized parameters

Examples

```
Y <- flanker
# congruent trials
congruent <- subset(Y, cond == 0)

# subset 25 from each group
dat <- congruent[unlist(tapply(1:nrow(congruent),
                               congruent$id,
                               head, 25)), ]

# fit model
fit <- vicc(y  = dat$rt,
            group = dat$id,
            iter = 250,
            burnin = 10,
            type =  "customary")

coef(fit)
```

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fixef.vicc *Extract Fixed Effects*

Description

Summarize the fixed effects.

Usage

```
## S3 method for class 'vicc'
fixef(object, cred = 0.9, ...)
```

Arguments

object	An object of class vicc.
cred	Numeric. Credible interval width (defaults to 0.90)
...	Currently ignored.

Value

Summarized fixed effects

Examples

```
# data
Y <- flanker

# congruent trials
congruent <- subset(Y, cond == 0)

# subset 25 from each group
dat <- congruent[unlist(tapply(1:nrow(congruent),
                               congruent$id,
                               head, 25)), ]

fit <- vicc(
  y  = dat$rt,
  group = dat$id,
  iter = 250,
  burnin = 10,
  type =  "pick_none"
  )

fixef(fit)
```

---

flanker *Data: Flanker Task data from Hedge et al. (2018).*

Description

A dataset containing 33660 rows and 7 columns.

- Block
- Trial number
- Arrow direction (1=left, 2=right)
- Condition (0 = congruent, 1=neutral, 2=incongruent)
- Correct (1) or incorrect (0)
- Reaction time (seconds)

Usage

```
data("flanker")
```

Format

A dataframe 33660 rows and 7 columns.

Note

Reaction times less than 0.20 and greater than 2 seconds were removed.

References

Hedge C, Powell G, Sumner P (2018). "The reliability paradox: Why robust cognitive tasks do not produce reliable individual differences." *Behavior Research Methods*, **50**(3), 1166–1186.

`pip` *Posterior Inclusion Probabilities*

Description

Extract the posterior inclusion probabilities (PIP) for either the random intercepts for sigma or the random effects standard deviation for sigma.

Usage

```
pip(object, ...)
```

Arguments

`object`	Ab object of class `vicc`.
`...`	Currently ignored.

Value

A data frame.

Note

The PIPs indicate whether the groups differ from the fixed effect, or average, within-group variance. If the PIP is large, this indicates there is high probability that group differs from the common variance. A marginal Bayes factor can be computed as PIP / (1 - PIP), assuming that `prior_prob = 0.5`.

Examples

```
# congruent trials
congruent <- subset(flanker, cond == 0)

# subset 25 from each group
dat <- congruent[unlist(tapply(1:nrow(congruent),
                               congruent$id,
                               head, 25)), ]

# fit model
fit <- vicc(y  = dat$rt,
            group = dat$id,
            iter = 250,
            burnin = 10,
            type =  "pick_group")

pip(fit)
```

`plot.pip` *Plot* `pip` *Objects*

Description

Bar plot for the posterior inclusion probabilities, which corresponds to the probability that each group differs from the average within-group variance.

Usage

```
## S3 method for class 'pip'
plot(x, fill = "black", width = 0.5, ...)
```

Arguments

`x`	An object of class `pip`.
`fill`	Character string. Which color for the bars (defaults to `black`)?
`width`	Numeric. The width for the bars (defaults to `0.5`).
`...`	Currently ignored

Value

A `ggplot` object.

Examples

```
# congruent trials
congruent <- subset(flanker, cond == 0)

# subset 25 from each group
dat <- congruent[unlist(tapply(1:nrow(congruent),
                               congruent$id,
                               head, 25)), ]
fit <- vicc(
  y  = dat$rt,
  group = dat$id,
  iter = 500,
  burnin = 10,
  type =  "pick_group"
)

pips <- pip(fit)

plot(pips)
```

`plot.vicc` *Plot* `vicc` *Objects*

Description

Plot the group-specific coefficients or the random effects.

Usage

```
## S3 method for class 'vicc'
plot(x, type = "coef", ...)
```

Arguments

`x`	An object of class `vicc`.
`type`	Character string. Which parameters should be plotted? The options are `ranef` and `coef` (the default).
`...`	Currently ignored.

Value

A `ggplot` object.

Examples

```
# congruent trials
congruent <- subset(flanker, cond == 0)

# subset 25 from each group
dat <- congruent[unlist(tapply(1:nrow(congruent),
                               congruent$id,
                               head, 25)), ]

# fit model
fit <- vicc(y  = dat$rt,
            group = dat$id,
            iter = 250,
            burnin = 10,
            type =  "customary")

plts <- plot(fit)
```

`posterior_samples` *Extract Posterior Samples*

Description

Extract posterior samples for `vicc` objects

Usage

```
posterior_samples(object)
```

Arguments

`object`	An object of class `vicc`

Value

An object of class `data.frame`

Examples

```
# congruent trials
congruent <- subset(flanker, cond == 0)

# subset 25 from each group
dat <- congruent[unlist(tapply(1:nrow(congruent),
                               congruent$id,
                               head, 25)), ]
```

```
# fit model
fit <- vicc(y  = dat$rt,
            group = dat$id,
            iter = 250,
            burnin = 10,
            type =  "customary")

samps <- posterior_samples(fit)
```

`print.pip` *Print* `pip` *Objects*

Description

Print `pip` Objects

Usage

```
## S3 method for class 'pip'
print(x, ...)
```

Arguments

`x`	An object of class `pip`.
`...`	Currently ignored.

`print.vicc` *Print* `vicc` *Objects*

Description

Print `vicc` Objects

Usage

```
## S3 method for class 'vicc'
print(x, cred = 0.95, ...)
```

Arguments

`x`	An object of class `vicc`.
`cred`	Numeric. Credible interval width (defaults to `0.90`).
`...`	Currently ignored

`ranef.vicc` *Extract the Random Effects*

Description

Extract the group-specific parameter estimates.

Usage

```
## S3 method for class 'vicc'
ranef(object, cred = 0.9, ...)
```

Arguments

`object`	An object of class `vicc`
`cred`	Numeric. Credible interval width (defaults to `0.90`).
`...`	Currently ignored.

Value

An array with the summarized parameters.

Examples

```
flanker <- vICC::flanker

# congruent trials
congruent <- subset(flanker, cond == 0)

# subset 25 from each group
dat <- congruent[unlist(tapply(1:nrow(congruent),
                               congruent$id,
                               head, 25)), ]

# fit model
fit <- vicc(y  = dat$rt,
            group = dat$id,
            iter = 250,
            burnin = 10,
            type =  "customary")

ranef(fit)
```

vicc *Varying Intraclass Correlation Coefficients*

Description

Compute varying intraclass correlation coefficients with the method introduced in Williams et al. (2019).

Usage

```
vicc(
  y,
  group,
  type = "pick_group",
  iter = 5000,
  chains = 2,
  burnin = 500,
  prior_scale = 1,
  prior_prob = 0.5
)
```

Arguments

y	Numeric vector. The outcome variable.
group	Numeric vector. The grouping variable (e.g., subjects). Note that the groups must be numbered from 1 to the total number of groups. See change_group.
type	Character string. Which model should be fitted (defaults to pick_group)? The options are described in Details.
iter	Numeric. The number of posterior samples per chain (excluding burnin).
chains	Numeric. The number of chains (defaults to 2).
burnin	Numeric. The number of burnin samples, which are discarded (defaults to 500).
prior_scale	Numeric. The prior distribution scale parameter (defaults to 1). Note the prior is a half student-t distribution with 10 degrees of freedom.
prior_prob	Numeric. The prior inclusion probability (defaults to 0.5). This is used for type = "pick_tau" or type = "pick_group" and ignored otherwise.

Value

An object of class vicc.

References

Williams DR, Martin SR, Rast P (2019). "Putting the Individual into Reliability: Bayesian Testing of Homogeneous Within-Person Variance in Hierarchical Models." *PsyArXiv*.

Examples

```
# congruent trials
congruent <- subset(flanker, cond == 0)

# subset 25 from each group
dat <- congruent[unlist(tapply(1:nrow(congruent),
                               congruent$id,
                               head, 25)), ]

# fit model
fit <- vicc(y  = dat$rt,
            group = dat$id,
            iter = 250,
            burnin = 10,
            type =  "customary")
```

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