Package: ESTER (via r-universe)

September 11, 2024

Title Efficient Sequential Testing with Evidence Ratios

Version 0.2.1

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Description An implementation of sequential testing that uses evidence ratios computed from the weights of a set of models. These weights correspond either to Akaike weights computed from the Akaike Information Criterion (AIC) or the Bayesian Information Criterion (BIC) and following Burnham & Anderson (2004, <doi:10.1177/0049124104268644>) recommendations, or to pseudo-BMA weights computed from the WAIC or the LOOIC of models fitted with 'brms' and following Yao et al. (2017, <arXiv:1704.02030v3>).

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LazyData yes

RoxygenNote 6.0.1

Depends R (>= 3.3.0)

Imports brms, lme4, dplyr, magrittr, tidyr, ggplot2, rlang

URL https://github.com/lnalborczyk/ESTER

BugReports https://github.com/lnalborczyk/ESTER/issues

Suggests knitr, rmarkdown, testthat

VignetteBuilder knitr

Repository https://lnalborczyk.r-universe.dev

RemoteUrl https://github.com/lnalborczyk/ester

RemoteRef HEAD

RemoteSha eee73e59b3e62caa936d64d563b6fa9d69e593b7

Contents

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aic   *Computes the Akaike Information Criterion*

Description

Computes the Akaike Information Criterion (AIC) of a model, or the second-order bias correction for small samples (AICc), as suggested by Burnham & Anderson (2002, 2004).

Usage

```
aic(mod, correction = TRUE)
```

Arguments

mod	A fitted model of class `lm` or `merMod`.
correction	Should we apply the second-order correction (default to TRUE) ?

Author(s)

Ladislas Nalborczyk <<ladislas.nalborczyk@gmail.com>>

References

Burnham, K. P., \& Anderson, D. R. (2002). Model Selection and Multimodel Inference: A Practical Information-Theoretical Approach. 2d ed. New York: Springer-Verlag.

Burnham, K. P., \& Anderson, D. R. (2004). Multimodel inference: Understanding AIC and BIC in model selection. Sociological Methods and Research, 33(2), 261-304.

See Also

bic, ictab

Examples

```
data(mtcars)
mod1 <- lm(mpg ~ cyl, mtcars)
aic(mod1)
```

---

bic *Computes the Bayesian Information Criterion*

Description

Computes the Bayesian Information Criterion of a model (Schwarz, 1978).

Usage

```
bic(mod)
```

Arguments

mod   A fitted model of class `lm` or `merMod`.

Author(s)

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References

Schwarz, G. (1978). Estimating the dimension of a model. Annals of Statistics, 6, 461-464.

See Also

aic, ictab

Examples

```
data(mtcars)
mod1 <- lm(mpg ~ cyl, mtcars)
bic(mod1)
```

ESTER *Efficient Sequential Testing with Evidence Ratios*

Description

The **ESTER** package implements sequential testing based on evidence ratios computed from the Akaike weights of a set of models. These weights are being computed using either the Akaike Information Criterion (AIC) or the Bayesian Information Criterion (BIC).

Details

See `vignette("ESTER")` for a general introduction and overview.

Author(s)

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See Also

[ictab](), [seqtest]()

| ictab | *Computes Akaike weights or pseudo-BMA weights of a set of models* |

Description

Returns a table with weights of a set of models, based on various information criteria. Currently, ictab supports the computation of Akaike weights from the aic or the bic computed on lm or merMod models, as well as the computation of pseudo-BMA weights, computed from the WAIC or LOOIC of brmsfit models.

Usage

```
ictab(mods, ic, ...)
```

Arguments

mods	Should be a named list of models, of class lm, merMod or brmsfit.
ic	Indicates which information criterion to use. Current supported information criteria include aic and bic for lm and merMod models, as well as WAIC and LOO for brmsfit models.
...	Additional parameters to be passed to the ic function.

Value

An object of class data.frame, which contains the value of the information criterion (either AIC, BIC, WAIC or LOOIC), the number of parameters (k for AIC and BIC or p for WAIC or LOOIC), the delta_IC (for AIC and BIC) or the elpd for models compared with WAIC or LOOIC, and the weight of each model (Akaike weights for AIC or BIC and pseudo-BMA weights for WAIC or LOOIC).

Author(s)

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References

Burnham, K. P., \& Anderson, D. R. (2002). Model Selection and Multimodel Inference: A Practical Information-Theoretical Approach. 2d ed. New York: Springer-Verlag.

Burnham, K. P., \& Anderson, D. R. (2004). Multimodel inference: Understanding AIC and BIC in model selection. Sociological Methods and Research, 33(2), 261-304.

Yao, Y. P., Vehtari, A., Simpson, D., \& Gelman, A. (2017). Using stacking to average Bayesian predictive distributions.

See Also

aic, bic

Examples

```
data(mtcars)
mod1 <- lm(mpg ~ cyl, mtcars)
mod2 <- lm(mpg ~ cyl + vs, mtcars)
mod3 <- lm(mpg ~ cyl * vs, mtcars)
mods <- list(mod1 = mod1, mod2 = mod2, mod3 = mod3)
ictab(mods, aic)

## Not run:
library(brms)
mod1 <- brm(mpg ~ cyl, mtcars)
mod2 <- brm(mpg ~ cyl + vs, mtcars)
mods <- list(m1 = mod1, m2 = mod2)
ictab(mods, LOO, reloo = TRUE, k_threshold = 0.6, cores = 2)

## End(Not run)
```

---

seqtest   *Sequential testing with evidence ratios*

Description

Computes sequential evidence ratios, either based on the AIC, BIC, WAIC, or LOOIC. Supported models currently include lm, merMod, or brmsfit models. When data involve repeated measures (and so multiple lines per subject), a column indicating the subject "id" should be provided to the id argument. If nothing is passed to the id argument, seqtest will suppose that there is only one observation (i.e., one line) per subject.

Usage

```
seqtest(ic = aic, mod1, mod2, nmin = 10, id = NULL, boundary = Inf,
  blind = FALSE, nsims = NULL)
```

Arguments

`ic`	Indicates whether to use the aic or the bic.
`mod1`	A model of class `lm` or `lmerMod`.
`mod2`	A model of class `lm` or `lmerMod` (of the same class of mod1).
`nmin`	Minimum sample size from which start to compute sequential evidence ratios.
`id`	If applicable (i.e., repeated measures), name of the "id" column of your dataframe, in character string.
`boundary`	The Evidence Ratio (or its reciprocal) at which the run is stopped as well
`blind`	If true, the function only returns a "continue or stop" message
`nsims`	Number of permutation samples to evaluate (is ignored if blind = TRUE)

Author(s)

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See Also

[ictab](#)

Examples

```
## Not run:
# A first simple example
data(mtcars)
mod1 <- lm(mpg ~ cyl, mtcars)
mod2 <- lm(mpg ~ cyl + disp, mtcars)
seqtest(ic = aic, mod1, mod2, nmin = 10)

# Plotting the results
seqtest(ic = aic, mod1, mod2, nmin = 10) %>% plot

# Example with 10 permutation samples
seqtest(ic = aic, mod1, mod2, nmin = 10, nsims = 10)

# Example with blinding
seqtest(ic = aic, mod1, mod2, nmin = 10, boundary = 10, blind = TRUE)

# Example with repeated measures
library(lme4)
data(sleepstudy)
mod1 <- lmer(Reaction ~ Days + (1|Subject), sleepstudy)
mod2 <- lmer(Reaction ~ Days + I(Days^2) + (1|Subject), sleepstudy)
seqtest(ic = aic, mod1, mod2, nmin = 10, id = "Subject", nsims = 10)

# Example with brmsfit models
library(brms)
mod1 <- brm(Reaction ~ Days + (1|Subject), sleepstudy)
mod2 <- brm(Reaction ~ Days + I(Days^2) + (1|Subject), sleepstudy)
seqtest(ic = WAIC, mod1, mod2, nmin = 10, id = "Subject")
```

```
## End(Not run)
```

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