Package 'AOV1R'

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Type Package

Title Inference in the Balanced One-Way ANOVA Model with Random Factor

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Description Provides functions to perform statistical inference in the balanced one-way ANOVA model with a random factor: confidence intervals, prediction interval, and Weerahandi generalized pivotal quantities. References: Burdick & Graybill (1992, ISBN-13: 978-0824786441); Weerahandi (1995) <doi:10.1007/978-1-4612-0825-9>; Lin & Liao (2008) <doi:10.1016/j.jspi.2008.01.001>.

License GPL-3

Encoding UTF-8

LazyData true

Depends R (>= 2.10)

Imports cellranger, purrr, stats, data.table, lazyeval, utils

RoxygenNote 7.1.1

Suggests knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

Repository CRAN

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Contents

aov1r *One-way random effect ANOVA*

Description

Fits a one-way random effect ANOVA model.

Usage

```
aov1r(formula, data = NULL)

## S3 method for class 'aov1r'
summary(object, ...)

## S3 method for class 'summary.aov1r'
print(x, ...)
```

Arguments

formula	a formula of the form y~group
data	optional dataframe
object	an aov1r object (output of an aov1r call)
...	ignored
x	output of summary

Value

aov1r returns an object of class aov1r;

Examples

```
dat <- simAOV1R(I=2, J=3, mu=10, sigmab=1, sigmaw=1)
fit <- aov1r(y ~ group, data=dat)
summary(fit)
```

confint.aov1r *Confidence intervals*

Description

Confidence intervals for the one-way random effect ANOVA.

Usage

```
## S3 method for class 'aov1r'
confint(object, parm, level = 0.95, SDs = TRUE, ...)

## S3 method for class 'confint.aov1r'
print(x, ...)
```

Arguments

object	an output of aov1r
parm	ignored
level	confidence level
SDs	logical, whether to return confidence intervals about the standard deviations or about the variances
...	ignored
x	an output of confint applied to an aov1r object

Value

A dataframe providing the bounds of the confidence intervals.

References

Richard K. Burdick, Franklin. A. Graybill. *Confidence Intervals on Variance Components*. CRC Press; 1st edition (1992). ISBN-13: 978-0824786441.

Examples

```
dat <- simAOV1R(I=2, J=3, mu=10, sigmab=1, sigmaw=1)
fit <- aov1r(y ~ group, data=dat)
confint(fit)
```

KM41 *Krishnamoorthy & Mathew's example 4.1*

Description

The dataset used in Krishnammorthy & Mathew's example 4.1.

Usage

```
data(KM41)
```

Format

A data frame with 25 rows and 2 columns.

References

Krishnamoorthy and Mathew, Statistical Tolerance Regions, Wiley 2009.

Examples

```
data(KM41)
str(KM41)
table(KM41$Batch)
```

`predict.aov1r` *Prediction interval for one-way random effect ANOVA*

Description

Prediction interval for the one-way random effect ANOVA model, based on a Satterthwaite approximation of the degrees of freedom.

Usage

```
## S3 method for class 'aov1r'
predict(object, level = 0.95, ...)
```

Arguments

`object`	an output of `aov1r`
`level`	confidence level
`...`	ignored

Value

A vector of length two, the bounds of the prediction interval.

References

T. Y. Lin, C. T. Liao. *Prediction intervals for general balanced linear random models*. Journal of Statistical Planning and Inference 138 (2008), 3164 – 3175. <doi:10.1016/j.jspi.2008.01.001>

Examples

```
dat <- simAOV1R(I=2, J=3, mu=10, sigmab=1, sigmaw=1)
fit <- aov1r(y ~ group, data=dat)
predict(fit)
```

rGPQ *Generalized pivotal quantities*

Description

Simulates from the generalized pivotal quantities.

Usage

```
rGPQ(fit, n = 10000)
```

Arguments

fit	an aov1r object
n	number of simulations

Value

The simulations in a dataframe.

References

Samaradasa Weerahandi. *Exact Statistical Methods for Data Analysis*. Springer, New York, NY (1995). <doi:10.1007/978-1-4612-0825-9>

Examples

```
dat <- simAOV1R(I=20, J=5, mu=10, sigmab=1, sigmaw=1)
fit <- aov1r(y ~ group, data=dat)
nsims <- 20000
pivsims <- rGPQ(fit, nsims)
pivsims$GPQ_sigma2tot <- pivsims$GPQ_sigma2b + pivsims$GPQ_sigma2w
# Generalized confidence intervals:
lapply(pivsims, quantile, probs = c(0.025, 0.975))
# compare with the frequentist confidence intervals:
confint(fit, SDs = FALSE)
# Generalized prediction interval:
with(
  pivsims,
  quantile(rnorm(nsims, GPQ_mu, sqrt(GPQ_sigma2tot)),
           probs = c(0.025, 0.975))
)
# compare with the frequentist prediction interval:
predict(fit)
```

simAOV1R *Simulation of one-way random effect ANOVA*

Description

Simulates a balanced one-way random effect ANOVA model.

Usage

```
simAOV1R(I, J, mu, sigmab, sigmaw)
```

Arguments

I	integer, number of groups
J	integer, number of replicates per group
mu	numeric, overall mean
sigmab	positive number, the between standard deviation
sigmaw	positive number, the within standard deviation

Value

A dataframe.

Examples

```
simAOV1R(I=2, J=3, mu=10, sigmab=1, sigmaw=1)
```

Index