Package 'nlmeU'

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Author Andrzej Galecki <agalecki@umich.edu>, Tomasz Burzykowski

<tomasz.burzykowski@uhasselt.be>

Maintainer Andrzej Galecki <agalecki@umich.edu>

Title Datasets and utility functions enhancing functionality of nlme
package.

Description nlmeU: Datasets and utility functions enhancing functionality of nlme package. Datasets, functions and scripts are described in book titled 'Linear Mixed-Effects Models: A Step-by-Step Approach' by Galecki and Burzykowski (2013). Package is under development.

Depends R (>= 2.14.2)

Imports nlme

Suggests reshape, WWGbook, lattice, ellipse, roxygen2, testthat

License GPL (>= 2)

URL http://www-personal.umich.edu/~agalecki/

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nlmeU–package   *Datasets and auxiliary functions for Galecki and Burzykowski book 2013.*

Description

Datasets and auxiliary functions for Galecki and Burzykowski book (2013).

Details

Datasets and auxiliary functions for Galecki and Burzykowski book (2013). Package under development.

Author(s)

<agalecki@umich.edu>, <Tomasz Burzykowski <tomasz.burzykowski@uhasselt.be>>

---

armd   *armd Data (867 x 8)*

Description

Data from Age-Related Macular Degeneration (ARMD) clinical trial

Format

The armd data frame has 867 rows and 8 columns. It contains data for n=234 subjects stored in a long format with up to four rows for one subject.

subject a factor with 234 levels 1, 2, 3, 4, 6, ..., 240

treat.f a factor with 2 levels Placebo, Active

visual0 an integer vector with values ranging from 20 to 85

miss.pat a factor with 8 levels ----, ---X, --X-, --XX, -XX-, ..., X-XX

time.f a factor with 4 levels 4wks, 12wks, 24wks, 52wks

time a numeric vector with values 4, 12, 24, 52

visual an integer vector with values ranging from 3 to 85

tp a numeric vector with values 1, 2, 3, 4 corresponding to time points 4, 12, 24, 52, respectively

Details

The ARMD data arise from a randomized multi-center clinical trial comparing an experimental treatment (interferon-alpha) versus placebo for patients diagnosed with ARMD.

Source

Pharmacological Therapy for Macular Degeneration Study Group (1997). Interferon alpha-IIA is ineffective for patients with choroidal neovascularization secondary to age-related macular degeneration. Results of a prospective randomized placebo-controlled clinical trial. Archives of Ophthalmology, 115, 865-872.

See Also

armd0, armd.wide

Examples

```
summary(armd)
```

---

armd.wide	*armd.wide Data (240 x 10)*

Description

Data from Age-Related Macular Degeneration (ARMD) clinical trial

Format

The `armd.wide` data frame has 240 rows and 10 columns. Data are stored in wide format with each row corresponding to one subject.

subject a factor with 240 levels 1, 2, 3, 4, 5, ..., 240

lesion an integer vector with values 1, 2, 3, 4

line0 an integer vector with values ranging from 5 to 17

visual0 an integer vector with values of visual acuity measured at baseline ranging from 20 to 85

visual4 an integer vector with values of visual acuity measured at 4 weeks ranging from 12 to 84

visual12 an integer vector with values of visual acuity measured at 12 weeks ranging from 3 to 85

visual24 an integer vector with values of visual acuity measured at 24 weeks ranging from 5 to 85

visual52 an integer vector with values of visual acuity measured at 52 weeks from 4 to 85

treat.f a factor with 2 levels `Placebo`, `Active`

miss.pat a factor with 9 levels `----`, `---X`, `--X-`, `--XX`, `-XX-`, ...,`XXXX`

Details

The ARMD data arise from a randomized multi-center clinical trial comparing an experimental treatment (interferon-alpha) versus placebo for patients diagnosed with ARMD.

Source

Pharmacological Therapy for Macular Degeneration Study Group (1997). Interferon alpha-IIA is ineffective for patients with choroidal neovascularization secondary to age-related macular degeneration. Results of a prospective randomized placebo-controlled clinical trial. Archives of Ophthalmology, 115, 865-872.

See Also

[armd](#), [armd0](#)

Examples

```
summary(armd.wide)
```

---

armd0   *armd0 Data (1107 x 8)*

Description

Data from Age-Related Macular Degeneration (ARMD) clinical trial

Format

The `armd0` data frame has 1107 rows and 8 columns. It contains data for n=240 subjects stored in a long format with up to five rows for one subject.

subject a factor with 240 levels 1, 2, 3, 4, 5, ...

treat.f a factor with 2 levels `Placebo`, `Active`

visual0 an integer vector with values from 20 to 85

miss.pat a factor with 9 levels `----`, `---X`, `--X-`, `--XX`, `-XX-`, ...

time.f a factor with 5 levels `Baseline`, `4wks`, `12wks`, `24wks`, `52wks`

time a numeric vector with values from 0 to 52

visual an integer vector with values from 3 to 85

tp a numeric vector with values from 0 to 4

Details

The ARMD data arise from a randomized multi-center clinical trial comparing an experimental treatment (interferon-alpha) versus placebo for patients diagnosed with ARMD.

Source

Pharmacological Therapy for Macular Degeneration Study Group (1997). Interferon alpha-IIA is ineffective for patients with choroidal neovascularization secondary to age-related macular degeneration. Results of a prospective randomized placebo-controlled clinical trial. Archives of Ophthalmology, 115, 865-872.

See Also

[armd](), [armd.wide]()

`fcat`	*fcat Data (4851 x 3)*

Description

Data from Flemish Community Attainment-Targets (FCAT) Study

Format

The `fcat` data frame has 4851 rows and 3 columns

target a factor with 9 levels `T1(4)`, `T2(6)`, `T3(8)`, `T4(5)`, `T5(9)`, ..., `T9(5)`

id a factor with 539 levels 1, 2, 3, 4, 5, ..., 539

scorec an integer vector with values from 0 to 9

Details

An educational study, in which elementary school graduates were evaluated with respect to reading comprehension in Dutch. Pupils from randomly selected schools were assessed for a set of nine attainment targets. The dataset is an example of grouped data, for which the grouping factors are crossed.

Source

Janssen, R., Tuerlinckx, F., Meulders, M., & De Boeck, P. (2000). A hierarchical IRT model for criterion-referenced measurement. Journal of Educational and Behavioral Statistics. 25(3), 285.

Examples

```
summary(fcat)
```

---

logLik1   *Calculates contribution of one subject to the log-likelihood*

Description

This function is generic; method functions can be written to handle specific classes of objects.

Usage

```
logLik1(modfit, dt1, dtInit)
```

Arguments

modfit	an object representing model fitted to data using ML estimation.
dt1	a data frame with data for one subject, for whom the log-likelihood function is to be evaluated
dtInit	an optional auxiliary data frame.

Value

numeric scalar value representing contribution of a given subject to the overall log-likelihood returned by `logLik()` function.

Author(s)

Andrzej Galecki and Tomasz Burzykowski

References

???

Examples

```
require(nlme)
  logLik(fm1 <- lme(distance ~ age, data = Orthodont)) # random is ~ age
  dt1 <- subset(Orthodont, Subject == "M01")
  logLik1(fm1, dt1)
```

---

logLik1.lme	*Calculates contribution of one subject to the log-likelihood for* lme *object*

Description

This is method for logLik1() generic function.

Usage

```
   ## S3 method for class 'lme'
 logLik1(modfit, dt1, dtInit)
```

Arguments

modfit   an lme object representing model fitted using maximum likelihood.

dt1   a data frame with data for one subject, for whom the log-likelihood function is
            to be evaluated

dtInit   an optional auxiliary data frame.

Details

Calculates profile likelihood (with beta profiled out) for *one* subject. Data with *one* level of
grouping only. correlation component in modelStruct not implemented.

Value

numeric scalar value representing contribution of a given subject to the overall log-likelihood re-
turned by logLik() function applied to lme object defined by modfit argument.

Author(s)

Andrzej Galecki and Tomasz Burzykowski

Examples

```
require(nlme)
lm3.form <- visual ~ visual0 + time + treat.f
(fm16.5ml <-                              # M16.5
   lme(lm3.form,
   random = list(subject = pdDiag(~time)),
   weights = varPower(form = ~time),
   data = armd, method = "ML"))
 df1 <- subset(armd, subject == "1")      # Panel R20.7
 logLik1(fm16.5ml, df1)
```

---

missPat   *Extract pattern of missing data*

Description

This function allows to compactly present pattern of missing data in a given vector/matrix/data frame or combination of thereof.

Usage

```
missPat(..., symbols = c("X", "-"), collapse = "",
   missData = FALSE)
```

Arguments

...	one or more vectors/matrices/data frames. They need to be compatible for columnwise binding.
symbols	vector containing two single characters used to indicate NA and remaining values. By defualt it has values: X and -.
collapse	an optional character string. It is used in the internal call paste() function to separate the results. Rarely used. By default set to NULL
missData	logical. If TRUE data frame with pattern of missing values is saved in missData attribute of the vector returned by this function.

Value

character vector with as many elements as length of vectors(s)/number of rows in matrices and/or data frames in ...{} argument(s). Attribute cnames contains names of vectors/columns/variables. Optional attribute missData contains data frame with missing pattern.

Author(s)

Andrzej Galecki and Tomasz Burzykowski

Examples

```
dtf <- subset(armd.wide,
              select = c(visual12, visual24, visual52))
missPat(dtf, symbols = c("?","+"))
```

---

prt   *prt Data (2471 x 9)*

Description

Data from a Progressive Resistance Randomized Trial.

Format

The `prt` data frame has 2471 rows and 9 columns. It contains data for n = 63 subjects. Each subject underwent muscle biopsy before and after intervention. Data are stored in a long format with each record corresponding to one muscle fiber. There are two types of muscle fibers: Type 1 and Type 2. Dependent variables: specific force and isometric force are measured pre- and post intervention.

id a factor with 63 levels 5, 10, 15, 20, 25, ..., 520 (subject id)

prt.f a factor with 2 levels High, Low, i.e. training (intervention) intensity

age.f a factor with 2 levels Young, Old (stratifying variable)

sex.f a factor with 2 levels Female, Male (stratifying variable)

bmi a numeric vector with values of BMI at baseline ranging from 18.36 to 32.29

iso.fo a numeric vector with values of isometric force ranging from 0.16 to 2.565

spec.fo a numeric vector with values of specific force ranging from 80.5 to 290

occ.f a factor with 2 levels Pre, Pos, i.e. pre- and post-intervention.

fiber.f a factor with 2 levels Type 1, Type 2, i.e. Type 1 and Type 2 muscle fiber.

Details

Data frame `prt` was obtained by merging `prt.subjects` and `prt.fiber`.

Source

Claflin, D.R., Larkin, L.M., Cederna, P.S., Horowitz, J.F., Alexander, N.B., Cole, N.M., Galecki, A.T., Chen, S., Nyquist, L.V., Carlson, B.M., Faulkner, J.A., & Ashton-Miller, J.A. (2011) Effects of high- and low-velocity resistance training on the contractile properties of skeletal muscle fibers from young and older humans. Journal of Applied Physiology, 111, 1021-1030.

See Also

`prt.fiber`, `prt.subjects`

Examples

```
summary(prt)
```

---

prt.fiber	*prt.fiber Data (2471 x 5)*

Description

Data from a Progressive Resistance Randomized Trial.

Format

The `prt.fiber` data frame has 2471 rows and 5 columns. Each row in the data corresponds to one muscle fiber collected during muscle biopsy. See `prt` data frame for the description of the study design.

id a factor with 63 levels 5, 10, 15, 20, 25, ..., 520

iso.fo a numeric vector with values of isometric force ranging from 0.16 to 2.565

spec.fo a numeric vector with values of specific force ranging from 80.5 to 290

occ.f a factor with 2 levels Pre, Pos, i.e. pre- and post- intervention

fiber.f a factor with 2 levels Type 1, Type 2, i.e. Type 1 and Type 2 muscle fiber.

Details

PRT trial was aimed for devising evidence-based methods for improving and measuring the mobility and muscle power of elderly men and women

Source

Claflin, D.R., Larkin, L.M., Cederna, P.S., Horowitz, J.F., Alexander, N.B., Cole, N.M., Galecki, A.T., Chen, S., Nyquist, L.V., Carlson, B.M., Faulkner, J.A., & Ashton-Miller, J.A. (2011) Effects of high- and low-velocity resistance training on the contractile properties of skeletal muscle fibers from young and older humans. Journal of Applied Physiology, 111, 1021-1030.

See Also

prt, prt.subjects

Examples

```
summary(prt.fiber)
```

prt.subjects	*prt.subjects Data (63 x 5)*

Description

Data prt.subjects ...

Format

The `prt.subjects` data frame has 63 rows and 5 columns

id a factor with 63 levels `5`, `10`, `15`, `20`, `25`, ...

prt.f a factor with 2 levels `High`, `Low`

age.f a factor with 2 levels `Young`, `Old`

sex.f a factor with 2 levels `Female`, `Male`

bmi a numeric vector with values from 18.4 to 32.3

Details

The working hypothesis was that a 12-week program of PRT would increase: (a) the power output of the overall musculature associated with movements of the ankles, knees, and hips; (b) the cross-sectional area and the force and power of permeabilized single fibers obtained from the vastus lateralis muscle; and (c) the ability of young and elderly men and women to safely arrest standardized falls. The training consisted of repeated leg extensions by shortening contractions of the leg extensor muscles against a resistance that was increased as the subject trained using a specially designed apparatus

Source

Claflin, D.R., Larkin, L.M., Cederna, P.S., Horowitz, J.F., Alexander, N.B., Cole, N.M., Galecki, A.T., Chen, S., Nyquist, L.V., Carlson, B.M., Faulkner, J.A., & Ashton-Miller, J.A. (2011) Effects of high- and low-velocity resistance training on the contractile properties of skeletal muscle fibers from young and older humans. Journal of Applied Physiology, 111, 1021-1030.

Examples

```
summary(prt.subjects)
```

Pwr   *Calculates power based on a model fit*

Description

This function is generic; method functions can be written to handle specific classes of objects.

Usage

```
Pwr(object, ...)
```

Arguments

object   an object containing the results returned by a model fitting function (e.g., lme).

...   some methods for this generic function may require additional arguments.

Value

numeric scalar value.

Author(s)

Andrzej Galecki and Tomasz Burzykowski

See Also

[Pwr.lme](Pwr.lme)

Examples

```
## Not run:
  Pwr (fm1)

## End(Not run)
```

Pwr.lme   *Performs power calculations*

Description

This is method for Pwr() generic function. It works fine for an example given in the book. It may
require additional testing, especially for post-hoc power analysis

Usage

```
  ## S3 method for class 'lme'
 Pwr(object, ...,
    type = c("sequential", "marginal"), Terms, L,
    verbose = FALSE, sigma, ddf = numeric(0), alpha = 0.05,
    altB = NULL, tol = 1e-10)
```

Arguments

object	an object containing lme fit, which provides information needed for power calculations
...	some additional arguments may be required.
type	an optional character string specifying the type of sum of squares to be used in F-tests needed for power calculations. Syntax is the same as for anova.lme() in nlme package.
Terms	an optional integer or character vector specifying which terms in the model should be jointly tested to be zero using a Wald F-test. See anova.lme in nlme package for details.
L	an optional numeric vector or array specifying linear combinations of the coefficients in the model that should be tested to be zero. See anova.lme in nlme package for details.
verbose	an optional logical value. See anova.lme in nlme package for details.
sigma	numeric scalar value.
ddf	numeric scalar value. Argument can be used to redefine default number of denominator degrees of freedom
alpha	numeric scalar value. By default 0.05.
altB	matrix/vector containing alternative values for beta parameters
tol	numeric scalar value.

Value

a data frame inheriting from class Pwr.lme

Author(s)

Andrzej Galecki and Tomasz Burzykowski

See Also

anova.lme

---

runScript   *Executes scripts from GB book*

Description

Default call of the function without arguments, prints a list of available scripts.

Usage

```
runScript(script = NA, package = "nlmeU",
   subdir = "scriptsR2.15.0", echo = TRUE)
```

Arguments

script   character string containing name of the script to be executed. By default is set
              to NA.

package   character string containing package name. By default nlmeU.

subdir   subdirectory containing scripts. By default: scriptsR15.0.

echo   logical. Used by source function. By default set to TRUE.

Value

Script is executed and results are printed.

Author(s)

Andrzej Galecki and Tomasz Burzykowski

Examples

```
runScript()
```

---

sigma   *Extract scale parameter sigma from a model fit*

Description

This function is generic; method functions can be written to handle specific classes of objects.

Usage

```
sigma(object, ...)
```

Arguments

`object`	an object for which scale parameter can be extracted.
`...`	some methods for this generic function may require additional arguments.

Value

numeric scalar value.

Author(s)

Andrzej Galecki and Tomasz Burzykowski

Examples

```
## sigma (fm1)
```

`SIIdata`	*SIIdata Data (1190 x 12)*

Description

Data from Study of Instructional Improvement Project

Format

The `SIIdata` data frame has 1190 rows and 12 columns. The dataset includes results for 1190 first grade pupils sampled from 312 classrooms in 107 schools.

sex a factor with 2 levels `M`, `F`,i.e. males and females, resepectively

minority a factor with 2 levels `Mnrt=No`, `Mnrt=Yes`. An indicator variable for the minority status

mathkind an integer vector with values from 290 to 629. This is pupil's math score in the spring of the kindergarten year

mathgain an integer vector with values from -110 to 253. Number represents pupil's gain in the math achievement score from the spring of kindergarten to the spring of first grade

ses a numeric vector with values from -1.61 to 3.21. Value represents socioeconomical status

yearstea a numeric vector with values from 0 to 40. It is number of years of teacher's experience in teaching in the first grade

mathknow a numeric vector with values from -2.5 to 2.61. Number represents teacher's knowledge of the first-grade math contents (higher values indicate a higher knowledge of the contents)

housepov a numeric vector containing proportion of households in the nneighborhood of the school below the poverty level with values ranging from 0.012 to 0.564

mathprep a numeric vector with values from 1 to 6. Contains the number of preparatory courses on the first-grade math contents and methods followed by the teacher.

classid a factor with 312 levels 1, 2, 3, 4, 5, ..., 312. Classroom's id

schoolid a factor with 107 levels 1, 2, 3, 4, 5, ..., `107`. School's id

childid a factor with 1190 levels 1, 2, 3, 4, 5, ..., `1190`. Pupil's id

Details

The SII Project was carried out to assess the math achievement scores of first- and third-grade pupils in randomly selected classrooms from a national US sample of elementary schools (Hill et al, 2005). Data were also analyzed in West et al, 2007. The outcome of interest is mathgain variable. Data were created based on classroom data from WWGbook package

Source

Hill, H., Rowan, B., and Ball, D. (2005). Effect of teachers mathematical knowledge for teaching on student achievement. American Educational Research Journal, 42, 371-406.

West, B. T.,Welch, K. B., and Galecki, A. T. (2007). Linear Mixed Models: A Practical Guide Using Statistical Software. Chapman and Hall/CRC.

Examples

```
summary(SIIdata)
```

---

simulateY   *Simulates values of the dependent variable based on a model fit*

Description

This function is generic; method functions can be written to handle specific classes of objects.

Usage

```
simulateY(object, nsim = 1, seed = NULL, ...,
  verbose = FALSE, sigma)
```

Arguments

object	an object with a model fit for which dependent variable is to be simulated.
nsim	number of simulations. nsim = 1 by default.
seed	integer scalar used to initiate random numbers generator.
...	some methods for this generic function may require additional arguments.
verbose	logical. If TRUE basic information about arguments is provided. By default set to FALSE.
sigma	numeric scalar. Allows to perform simulations employing alternative value of the scale parameter.

Value

numeric matrix. Number of columns determined by nsim argument.

Author(s)

Andrzej Galecki and Tomasz Burzykowski

Examples

```
## simulateY (fm1)
```

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