Package 'LearnVizLMM'

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Title Learning and Communicating Linear Mixed Models Without Data

Version 1.0.0

Description Summarizes characteristics of linear mixed effects models without data or a fitted model by converting code for fitting lmer() from 'lme4' and lme() from 'nlme' into tables, equations, and visuals. Outputs can be used to learn how to fit linear mixed effects models in 'R' and to communicate about these models in presentations, manuscripts, and analysis plans.

URL https://github.com/kzavez/LearnVizLMM

BugReports https://github.com/kzavez/LearnVizLMM/issues

License GPL (>= 3)

Encoding UTF-8

RoxygenNote 7.3.2

Imports cli, DiagrammeR, DiagrammeRsvg, dplyr, rsvg, stringr

Suggests kableExtra, knitr, rmarkdown, testthat (>= 3.0.0)

Config/testthat/edition 3

VignetteBuilder knitr

NeedsCompilation no

Author Katherine Zavez [aut, cre],
Ofer Harel [aut]

Maintainer Katherine Zavez <Katherine.Zavez@uconn.edu>

Repository CRAN

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`extract_equation` *Model equation in 'LaTeX' format*

Description

`extract_equation()` takes the `nlme::lme()` or `lme4::lmer()` code for fitting a linear mixed effect model and returns the corresponding model equation written in 'LaTeX' notation.

Usage

```
extract_equation(
  model,
  cat_vars = NULL,
  cat_vars_nlevels = NULL,
  output_type = "latex"
)
```

Arguments

`model`	Code for fitting a `nlme::lme()` or `lme4::lmer()` model given as a string.
`cat_vars`	Optional character vector of the names of categorical predictor variables included in the `model`. Default is `NULL`, which assumes that all predictor variables are numeric.
`cat_vars_nlevels`	Optional numeric vector of the number of levels (i.e. categories) for each variable in `cat_vars`. Must be a vector of same length as `cat_vars`. Values must be whole numbers greater than `1` and less than `10`. Only applies if `cat_vars` is not `NULL`.
`output_type`	Output type can be `"latex"` (default), `"string"`, or `"none"`.

Value

None (invisible NULL) (`output_type = "latex"`), a string (`output_type = "string"`), or no output (`output_type = "none"`).

Examples

```
# Different ways to write the same lme model
extract_equation(model = "lme(score ~ age, random=~age|subject)")
extract_equation(model = "lme(score ~ age, random=list(subject=~age))")

# Correlated vs. Uncorrelated
extract_equation(model = "lmer(score ~ age + (age|subject))")
extract_equation(model = "lmer(score ~ age + (age||subject))")

# Add a categorical predictor and interaction
extract_equation(model = "lmer(score ~ age*treat + (age|subject))",
                 cat_vars = "treat",
                 cat_vars_nlevels = 3)
```

`extract_structure` *Image of the data structure*

Description

`extract_structure` generates an image of the multilevel data structure. It does this in two steps. First, characteristics of the group(s) or grouping factor(s) are identified via the `model` input or the `n_gf`, `gf_description`, and `gf_names` inputs. Second, this information is used to run `DiagrammeR::grViz()`, which returns an image.

Usage

```
extract_structure(
  model = NULL,
  n_gf = NULL,
  gf_description = NULL,
  gf_names = NULL,
  gf_nlevels = NULL,
  gf3_index = "i",
  label_levels = "yes",
  export_type = "print"
)
```

Arguments

`model`	Code for fitting a `nlme::lme()` or `lme4::lmer()` model given as a string.
`n_gf`	Number of groups or grouping factors: `1`, `2`, or `3`. Only applies if `model` is `NULL`.
`gf_description`	Description of the structure of the groups or grouping factors: `"nested"`, `"crossed"`, `"crossed with nested"`, or `"crossed within nested"`. Only applies if `n_gf` is greater than `1` and `model` is `NULL`.
`gf_names`	Character vector of the names of group(s) or grouping factor(s). For nested, order names by level from highest to lowest. Must be a vector of length equal to `n_gf`. Only applies if `model` is `NULL`.
`gf_nlevels`	Optional numeric or character vector of the number of levels for each group or grouping factor in the `model` or `gf_names`.
`gf3_index`	String for the index of the highest-level group or grouping factor. Only applies if `n_gf` is `3`. Default is `"i"`.
`label_levels`	Indicates whether levels of the data structure should be labeled on the left-hand side of the figure (default) or not (`label_levels = "no"`).
`export_type`	Export type can be `"print"` (default), `"png"` to save as a PNG file, or `"text"` to get the input used to run `DiagrammeR::grViz()`.

Value

A PNG (`export_type = "png"`), character (`export_type = "text"`), or object of class htmlwidget that will print in the R console, within R Markdown documents, and within Shiny output bindings (`export_type = "print"`).

Examples

```
# Using the model input
extract_structure(model = "lme(Score ~ type, random=list(School=pdDiag(~1+type),Class=~1))")
extract_structure(model = "lme(Weight ~ Time, random=~Time|Subject, data)",
                  gf_nlevels = 47)
extract_structure(model = "lmer(Strength ~ 1 + (1|Machine) + (1|Worker))",
                  gf_nlevels = c("23", "J"))

# Using the n_gf, gf_description, and gf_names inputs
extract_structure(n_gf = 1,
                  gf_names = "Subject")
extract_structure(n_gf = 3,
                  gf_description = "nested",
                  gf_names = c("District", "School", "Class"),
                  gf_nlevels = c(8, 15, 5),
                  label_levels = "no")
```

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extract_variables *Roles of variables*

Description

`extract_variables()` returns a data frame of information of the variables in a `nlme::lme()` or `lme4::lmer()` model. The columns of the data frame include: `Effect` (whether the effect is random or fixed), `Group` (group or grouping factor associated with random effects), `Term` (notation used to include the variable in the model), `Description` (description of the `Term`), and `Parameter` (parameter estimated when the model is fit).

Usage

```
extract_variables(model, cat_vars = NULL, cat_vars_nlevels = NULL)
```

Arguments

`model`	Code for fitting a `nlme::lme()` or `lme4::lmer()` model given as a string.
`cat_vars`	Optional character vector of the names of categorical predictor variables included in the `model`. Default is `NULL`, which assumes that all predictor variables are numeric.
`cat_vars_nlevels`	Optional numeric vector of the number of levels (i.e. categories) for each variable in `cat_vars`. Must be a vector of same length as `cat_vars`. Values must be whole numbers greater than `1` and less than `10`. Only applies if `cat_vars` is not `NULL`.

Value

A data frame.

Examples

```
# lme()
extract_variables(model = "lme(Score~type,random=list(School=pdDiag(~1+type),Class=~1))",
                  cat_vars = "type",
                  cat_vars_nlevels = 2)
extract_variables(model = "lme(weight~1+Time+I(Time^2),random=~Time+I(Time^2)|ID)")

# lmer()
extract_variables(model = "lmer(Strength ~ 1 + (1|Machine) + (1|Worker))")
extract_variables(model = "lmer(score ~ age*treat + (age|subject))",
                  cat_vars = "treat",
                  cat_vars_nlevels = 3)
```

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