Package ‘semnova’

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Title Latent Repeated Measures ANOVA
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Description Latent repeated measures ANOVA (L-RM-ANOVA) is a structural
equation modeling based alternative to traditional repeated measures ANOVA.
L-RM-ANOVA extends the latent growth components approach by
latent variables to repeated measures analysis.
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### anova, lgc-method

*Comparing the fit of LGC objects.*

**Description**

Comparing the fit of LGC objects.

**Usage**

```r
## S4 method for signature 'lgc'
anova(object, ...)
```

**Arguments**

- `object`  
  lgc object. An lgc object to be compared against other lgc objects.
- `...`  
  lgc object. More lgc objects to be compared.

---

### create_mmodel

*Specifying a measurement model.*

**Description**

Specifying a measurement model.

**Usage**

```r
create_mmodel(..., list = NULL, lv_scaling = "effect", invariance = NULL)
```

**Arguments**

- `...`  
  Named arguments each representing a latent variable. The arguments are character vectors containing the variable names the latent variables are measured by.
- `list`  
  List. Each list element represents a latent variable. List elements are character vectors containing the variable names the latent variables are measured by.
- `lv_scaling`  
  Character vector. Defines the strategy for latent variable scaling. Default is `lv_scaling = "effect"`. Possible strategies are: c("effect", "referent").
- `invariance`  
  Not yet implemented.

**Value**

Object of classe `mmodel`. 
Examples

```r
mmodel <- create_mmodel(
  A1B1 = "var1",
  A2B1 = "var2",
  A3B1 = "var3",
  A1B2 = "var4",
  A2B2 = "var5",
  A3B2 = "var6",
  lv_scaling = "referent"
)
```

**lgc**

*General function to specify a general latent growth components model.*

**Description**

General function to specify a general latent growth components model.

**Usage**

```r
lgc(
  data,
  mmodel,
  C_matrix,
  hypotheses = NULL,
  covariates = NULL,
  groups = NULL,
  append = NULL,
  verbose = FALSE,
  compound_symmetry = FALSE,
  sphericity = FALSE,
  multiv_tests = c("wilks", "wald"),
  univ_tests = NULL,
  randomization = list(ncores = 1, nsamples = 1000),
  ...
)
```

**Arguments**

- `data` - Dataframe. Data object to be passed to lavaan.
- `mmodel` - Object of class mmodel. If not provided, manifest variables from the formula object will be used. Otherwise, use `create_mmodel()` to specify measurement model.
- `C_matrix` - Contrast matrix. Must be invertible.
hypotheses: List of numeric vectors. Each list element represents a hypothesis. For each hypothesis, the contrasts indicated by the elements of the vectors are tested against zero.

covariates: Not implemented yet.

groups: Not implemented yet.

append: Character. Syntax that is to be appended to lavaan syntax.

verbose: Boolean. Print details during procedure.

compound_symmetry: Boolean. When set to TRUE, compound symmetry is assumed.

sphericity: Boolean or formula. When set to TRUE, sphericity is assumed for all effects.

multiv_tests: Character vector. Multivariate test statistics that are to be computed. Possible statistics are: c("wilks", "wald"). Default is multiv_tests = c("wilks", "wald").

univ_tests: Character vector. Univariate test statistics that are to be computed. Possible statistics are: c("F"). Default is univ_tests = NULL.

randomization: Not yet supported.

...: Additional arguments to be passed to lavaan.

Value

Function returns an lgc object. Use summary(object) to print hypotheses. Otherwise use object@sem_obj to get access to the underlying lavaan object.

Examples

set.seed(323412431)

data("semnova_test_data", package = "semnova")

mmodel <- create_mmodel(
  A1B1 = "var1",
  A2B1 = "var2",
  A3B1 = "var3",
  A1B2 = "var4",
  A2B2 = "var5",
  A3B2 = "var6",
  lv_scaling = "referent"
)

hypotheses <- list(
  Intercept = c(1),
  A      = c(2, 3),
  B      = c(4),
  AB     = c(5, 6)
)

C_matrix <- matrix(
c(1, 1, 0, 1, 1, 0,
1, 0, 1, 1, 0, 1,
1,-1,-1, 1,-1,-1,
1, 1, 0,-1,-1, 0,
1, 0, 1,-1, 0,-1,
1,-1,-1,-1, 1, 1),
  nrow=6)

fit_lgc <- lgc(data = semnova_test_data, mmodel, C_matrix, hypotheses)
summary(fit_lgc)

### lgc-class

**LGC Class.**

**Description**

LGC Class.

**semnova**

*Latent repeated-measures ANOVA using the LGC approach*

**Description**

Function specifies an LGC model. The idata object is used to create the contrast matrix that is
passed to the lgc() function. Typical hypotheses are specified as well.

**Usage**

```r
semnova(
  formula,
  idesign,
  idata,
  data,
  mmodel = NULL,
  covariates = NULL,
  groups = NULL,
  append = NULL,
  icontrasts = c("contr.poly", "contr.sum"),
  verbose = FALSE,
  compound_symmetry = FALSE,
  sphericity = FALSE,
  multiv_tests = c("wilks", "wald"),
  univ_tests = c("F"),
  randomization = list(ncores = 1, nsamples = 1000),
  ...
)
```
Arguments

- **formula**: Formula. Within-subjects design formula.
- **idesign**: Dataframe. The dataframe contains the factorial design.
- **idata**: Dataframe. Data object to be passed to lavaan.
- **data**: Dataframe. Data object to be passed to lavaan.
- **mmodel**: Object of class `mmodel`. If not provided, manifest variables from the formula object will be used. Otherwise, use `create_mmodel()` to specify measurement model.
- **covariates**: Not implemented yet.
- **groups**: Not implemented yet.
- **append**: Character vector. Syntax that is to be appended to lavaan syntax.
- **icontrasts**: Character vector. Use this argument to select the type of contrasts to be used. Default is `c("contr.sum", "contr.poly")` (not ordered, ordered).
- **verbose**: Boolean. Print details during procedure.
- **compound_symmetry**: Boolean. When set to TRUE, compound symmetry is assumed among dependent variables.
- **sphericity**: Boolean or formula. When set to TRUE, sphericity is assumed for all effects.
- **multiv_tests**: Character vector. Multivariate test statistics that are to be computed. Possible statistics are: `c("wilks", "wald")`. Default is `multiv_tests = c("wilks", "wald")`.
- **univ_tests**: Character vector. Univariate test statistics that are to be computed. Possible statistics are: `c("F")`. Default is `univ_tests = NULL`.
- **randomization**: Not yet supported.
- **...**: Additional arguments to be passed to lavaan.

Value

Function returns an `lgc` object. Use `summary(object)` to print hypotheses. Otherwise use `object@sem_obj` to get access to the underlying lavaan object.

Examples

```r
set.seed(323412431)

data("semnova_test_data", package = "semnova")


mmodel <- create_mmodel(
    A1B1 = "var1",
    A2B1 = "var2",
    A3B1 = "var3",
    A1B2 = "var4",
)```


A2B2 = "var5",
A3B2 = "var6",
lv_scaling = "referent"
)

fit_semnova <-
  semnova(
    formula = cbind(A1B1, A2B1, A3B1, A1B2, A2B2, A3B2) ~ 1,
    data = semnova_test_data,
    idata = idata,
    idesign = ~ A * B,
    mmodel = mmodel
  )

summary(fit_semnova)

semnova_test_data

This data set serves for examples and tests.

Description

This is a simulated data set that 100 observation of six normally distributed variables with mean = 0, variance = 1 and covariance 0.5.

Usage

semnova_test_data

Format

A data frame with 100 rows and 6 variables:

summary, lgc-method

Printing the summary for an LGC object.

Description

Printing the summary for an LGC object.

Usage

## S4 method for signature 'lgc'
summary(object, ...)

Arguments

object  1gc object. The object to get a summary about.
...  Additional arguments. Currently none supported.
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