

Package ‘supernova’

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Type Package

Title Judd, McClelland, & Ryan Formatting for ANOVA Output

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Description

Produces ANOVA tables in the format used by Judd, McClelland, and Ryan (2017, ISBN:978-1138819832) in their introductory textbook, Data Analysis. This includes proportional reduction in error and formatting to improve ease the transition between the book and R.

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Suggests car, dplyr, mosaic, Lock5withR, okcupiddata, fivethirtyeight, purrr, rlang, testthat

RoxygenNote 6.1.1

URL <https://github.com/UCLATALL/supernova>

BugReports <https://github.com/UCLATALL/supernova/issues>

NeedsCompilation no

Author Adam Blake [aut],
Jeff Chrabaszcz [aut],
Ji Son [aut],
Jim Stigler [cre, aut]

Maintainer Jim Stigler <jstigler@gmail.com>

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 b0

b0

Description

A function to extract intercept/beta0 value.

Usage

```
b0(fit, ...)
```

```
## Default S3 method:
```

```
b0(fit, ...)
```

```
## S3 method for class 'formula'
```

```
b0(formula, data = list(), ...)
```

Arguments

<code>fit</code>	A <code>lm</code> object.
<code>...</code>	Passthrough arguments to <code>lm</code> .
<code>formula</code>	A <code>formula</code> .
<code>data</code>	A <code>data.frame</code> .

Value

The intercept of the relevant model.

`b1`*b1*

Description

A function to extract slope/beta1 value.

Usage

```
b1(fit, ...)
```

```
## Default S3 method:
```

```
b1(fit, ...)
```

```
## S3 method for class 'formula'
```

```
b1(formula, data = list(), ...)
```

Arguments

<code>fit</code>	A <code>lm</code> object.
<code>...</code>	Passthrough arguments to <code>lm</code> .
<code>formula</code>	A <code>formula</code> .
<code>data</code>	A <code>data.frame</code> .

Value

The slope of the relevant model.

`Fingers`*Data from introductory statistics students at a university.*

Description

Students at a university taking an introductory statistics course were asked to complete this survey as part of their homework.

Usage

```
Fingers
```

Format

A dataset with 157 observations on the following 16 variables.

Sex Sex of participant.

RaceEthnic Racial or ethnic background.

FamilyMembers Members of immediate family (excluding self).

SSLast Last digit of social security number (NA if no SSN).

Year Year in school: 1=First, 2=Second, 3=Third, 4=Fourth, 5=Other

Job Current employment status: 0=not working, 1=part-time job, 2=full-time job

MathAnxious Agreement with this statement "In general I tend to feel very anxious about mathematics": 2=Strongly Agree, 1=Agree, 0=Neither Agree nor Disagree, -1=Disagree, -2=Strongly Disagree

Interest Interest in statistics and the course: 2=very interested in course and statistics, 1=somewhat interested, 0=no interest, -1=dread the course.

GradePredict Prediction for final grade in the course from the university's grade points per unit: 4.0=A, 3.7=A-, 3.3=B+, 3.0=B, 2.7=B-, 2.3=C+, 2.0=C, 1.7=C-, 1.3=Below C-

Thumb Length in mm from tip of thumb to the crease between the thumb and palm.

Index Length in mm from tip of index finger to the crease between the index finger and palm.

Middle Length in mm from tip of middle finger to the crease between the middle finger and palm.

Ring Length in mm from tip of ring finger to the crease between the middle finger and palm.

Pinkie Length in mm from tip of pinkie finger to the crease between the pinkie finger and palm

Height Height in inches.

Weight Weight in pounds.

Fingers.messy

Data from introductory statistics students at a university.

Description

Students at a university taking an introductory statistics course were asked to complete this survey as part of their homework.

Usage

Fingers.messy

Format

A dataset with 210 observations on the following 16 variables.

Sex Sex of participant: 1=female, 2=male, 3=prefer not to answer

RaceEthnic Racial or ethnic background: 1=White, 2=African American, 3=Asian, 4=Latino, 5=Other

FamilyMembers Members of immediate family (excluding self).

SSLast Last digit of social security number (NA if no SSN).

Year Year in school.

Job Current employment status.

MathAnxious Agreement with this statement "In general I tend to feel very anxious about mathematics."

Interest Interest in statistics and the course.

GradePredict Prediction for final grade in the course from the university's grade points per unit.

Thumb Length in mm from tip of thumb to the crease between the thumb and palm.

Index Length in mm from tip of index finger to the crease between the index finger and palm.

Middle Length in mm from tip of middle finger to the crease between the middle finger and palm.

Ring Length in mm from tip of ring finger to the crease between the middle finger and palm.

Pinkie Length in mm from tip of pinkie finger to the crease between the pinkie finger and palm

Height Height in inches.

Weight Weight in pounds.

fVal

fVal

Description

A function to extract F value

Usage

```
fVal(fit, ...)
```

```
## Default S3 method:
```

```
fVal(fit, ...)
```

```
## S3 method for class 'formula'
```

```
fVal(formula, data = list(), ...)
```

Arguments

<code>fit</code>	A <code>lm</code> object.
<code>...</code>	Passthrough arguments to <code>lm</code> .
<code>formula</code>	A <code>formula</code> .
<code>data</code>	A <code>data.frame</code> .

Value

The F value of the relevant model.

```
PRE
```

```
PRE
```

Description

A function to extract PRE values

Usage

```
PRE(fit, ...)
```

```
## Default S3 method:
```

```
PRE(fit, ...)
```

```
## S3 method for class 'formula'
```

```
PRE(formula, data = list(), ...)
```

Arguments

<code>fit</code>	A <code>lm</code> object.
<code>...</code>	Passthrough arguments to <code>lm</code> .
<code>formula</code>	A <code>formula</code> .
<code>data</code>	A <code>data.frame</code> .

Value

The PRE value of the relevant model.

`print.supernova` *print.supernova*

Description

A print method for the `supernova` class

Usage

```
## S3 method for class 'supernova'  
print(x, pcut = 4, ...)
```

Arguments

<code>x</code>	A supernova object.
<code>pcut</code>	The integer number of decimal places of p-values to show.
<code>...</code>	Additional display arguments.

`Servers` *Data about tips collected from an experiment with 44 servers.*

Description

`Servers`.

Usage

`Servers`

Format

A dataset with 44 observations on the following 2 variables.

ServerID A number assigned to each server.

Tip How much the tip was.

supernova

supernova

Description

An alternative set of summary statistics for ANOVA. Sums of squares, degrees of freedom, mean squares, and F value are all computed with type 3 sums of squares. This package adds proportional reduction in error, an explicit summary of the whole model, and separate formatting of p values and is intended to match the output used in Judd, McClelland, and Ryan (2017).

Usage

```
supernova(fit)
```

Arguments

`fit` A fitted `lm` object

Details

`superanova()` is an alias of `supernova()`

Value

An object of the class `supernova`, which has a clean print method for displaying the ANOVA table in the console as well as a named list:

`tbl` The ANOVA table as a `data.frame`

`fit` The original `lm` object being tested

References

Judd, C. M., McClelland, G. H., & Ryan, C. S. (2017). *Data Analysis: A Model Comparison Approach to Regression, ANOVA, and Beyond* (3rd ed.). New York: Routledge. ISBN:879-1138819832

Examples

```
supernova(lm(Thumb ~ Weight, data = Fingers))
```

Survey	<i>Students at a university were asked to enter a random number between 1-20 into a survey.</i>
--------	---

Description

Students at a university taking an introductory statistics course were asked to complete this survey as part of their homework.

Usage

Survey

Format

A dataset with 211 observations on the following 1 variable:

Any1_20 The random number between 1 and 20 that a student thought of.

TipExperiment	<i>Data about tips collected from an experiment with 44 servers.</i>
---------------	--

Description

Servers were randomly assigned to write nothing or "Thank you" on the back of customers' receipts. This experiment was an effort to examine whether the note would cause more generous tipping.

Usage

TipExperiment

Format

A dataset with 44 observations on the following 3 variables.

ServerID A number assigned to each server.

Tip How much the tip was.

Condition Which experimental condition the server was randomly assigned to.

update	<i>Robust version of update</i>
--------	---

Description

This function solves two problems with [update](#): pipes will break when the data is first piped to the `lm` object, and data is re-evaluated against the full dataset, even if the model being updated had `na.action = "na.omit"`. See details below for more information.

Usage

```
update(old, new, ...)
```

Arguments

<code>old</code>	An existing fit from a model function such as <code>lm</code> , <code>glm</code> and many others.
<code>new</code>	Changes to the formula; see update.formula for details.
<code>...</code>	Additional arguments to the call (see update), or arguments with changed values. Use <code>name = NULL</code> to remove the argument name.

Details

Problem with pipes: [update](#) does not support linear models where the data was piped via `%>%` to the model function as in `mtcars %>% lm(mpg ~ hp, data = .) %>% stats::update()`. This is because the [update](#) function relies on `getCall`, which returns a call that has `data = .` argument, which is completely uninformative. This function creates a new model by extracting the formula from the old model via `formula` and the data used in the old model via the `model$call` and environment. Then the new (old) model is updated as it now has all the necessary components.

Problem with `na.action`: When updating models with missing data, the new model is evaluated against the full dataset even if the original model had missing data for some of the values. For example, if there are missing values on X for a model where $Y \sim X$, when updating to fit the null model $Y \sim \text{NULL}$, the full set of Y is used instead of only the values of Y where there are values of X. This is not inherently a problem, however it yields incorrect degrees of freedom and sum of squares for the total row in an ANOVA because different datasets are being used for the total row and the model and error rows. The present solution creates NA values listwise for all variables in the old model so that the new model does not use those data.

Value

If `evaluate = TRUE` the fitted object, otherwise the updated call.

`variables`*Extract the variables from a model*

Description

Extract the variables from a model

Usage

```
variables(object)
```

Arguments

`object` An `lm` or `supernova` object

Value

A list containing the outcome and predictor variables in the model.

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