Package ‘iNZightMR’

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Type Package

Title Tools for Exploring Multiple Response Data

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Contact inzight_support@stat.auckland.ac.nz

URL https://inzight.nz

Depends R (>= 2.13)

Imports grid, grDevices, graphics, stats, utils

Suggests iNZightPlots, testthat, covr

LazyData true

Description Interaction and analysis of multiple response data, along with other tools for analysing these types of data including missing value analysis and calculation of standard errors for a range of covariance matrix results (proportions, multinomial, independent samples, and multiple response).

License GPL-3

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iNZightMR-package  iNZightMR: Multiple Response Data Analysis

Description

The iNZightMR package provides a suite of functions which can be used in the analysis of multiple response data. It is used in the iNZight software package.

Author(s)

Junjie Zeng, Tom Elliott

barplotMR  Multiple response barplot

Description

Draws a barplot of a multiple response object (MRO), showing response rates for each option along with confidence intervals and comparison intervals.
Usage

barplotMR(obj, ...)

## S3 method for class 'mrocalc'
barplotMR(obj, ...)

## S3 method for class 'bymrocalc'
barplotMR(obj, g1.level = NULL, g2.level = "_MULTI", ...)

## S3 method for class 'between'
barplotMR(obj, ...)

## S3 method for class 'b2'
barplotMR(obj, g1.level = NULL, ...)

Arguments

obj an mrocalc object (from mroPara())

... additional parameters, currently not used

g1.level vector of subset variable 1 levels to show

g2.level vector of subset variable 2 levels to show

Methods (by class)

- mrocalc: method for class mrocalc
- bymrocalc: method for class bymrocalc
- between: method for class between
- b2: method for class b2

Author(s)

Junjie Zheng

Examples

if (requireNamespace("iNZightPlots")) {
  mr <- iNZightMR(online ~ onlinegame + onlinevideo + onlinemusic,
                  data = census.at.school.5000)
  barplotMR(mroPara(mr))

  barplotMR(byMRO(mr, ~gender, mroPara))
}
between  

*Compute Between se's*

**Description**

Between SEs

**Usage**

`between(byMRO)`

**Arguments**

- `byMRO` a byMRO object

**Value**

something about between.

**Author(s)**

Junjie Zheng

**Examples**

```r
mr <- iNZightMR(online ~ onlinegame + onlinevideo + onlinemusic,
    data = census.at.school.5000)
(bt <- between(byMRO(mr, ~gender, mroPara)))

if (requireNamespace("iNZightPlots"))
    barplotMR(bt)
```

---

byMRO  

*Calculate MRO inference for subsets*

**Description**

Constructs a multiple response object (MRO) subset by another explanatory variable.

**Usage**

`byMRO(mro.obj, formula, FUN, ...)`
Arguments

- **mro.obj**: an mro object (created by iNZightMR)
- **formula**: variable for subsetting, as a formula (e.g., ~x)
- **FUN**: the function to apply to subsets
- **...**: additional arguments passed to FUN

Value

An object with classes of by and bymrocalc

See Also

mroPara

Examples

```r
mr <- iNZightMR(online ~ onlinegame + onlinevideo + onlinemusic,
               data = census.at.school.5000)

byMRO(mr, ~gender, mroPara)
byMRO(mr, ~gender + handed, mroPara)
```

Description

Calculates the summary of missingness in a data set.

Usage

calcmissing(obj, ...)

## S3 method for class 'data.frame'
calcmissing(obj, MRO.case = FALSE, print = TRUE, final = TRUE, ...)

## S3 method for class 'mro'
calcmissing(obj, ...)

Arguments

- **obj**: An object
- **...**: additional arguments
- **MRO.case**: does something with rownames
- **print**: logical, should we print the thing?
- **final**: logical, is this final?
Value

Missing value object

Methods (by class)

- `data.frame`: Method for a dataframe
- `mro`: accepts a whole `mr.object`, which is first `mro.mat`, second element labels, third element the input data frame.

Author(s)

Junjie Zeng

See Also

`plotcombn`

Examples

```r
calcmissing(census.at.school.5000[,1:20])
```

census.at.school.5000  Census at School 5000

Description

A dataset containing 5000 observations from a New Zealand census of school students. It includes binary response variables.

Usage

census.at.school.5000

Format

A data frame with 72 variables and 5000 rows.

- **X**  unique identifier for each observation
- **gender**  their biological gender
- **age**  their age, years
- **country**  The country the student is from
- **country_en**  Country code
- **country_mi**  A different country code
- **ethniceng**  binary for ethnicity english
- **ethnicmri**  binary for ethnicity maori
ethnicwsm  binary for ethnicity wsm
ethniccok  binary for ethnicity cok
ethnicton  binary for ethnicity tonga
ethnicniu  binary for ethnicity niue
ethnicchn  binary for ethnicity china
ethnicind  binary for ethnicity india
ethnicother  factor for other ethnicity
ethnicother_en  factor for other ethnicity_en
ethnicother_mi  factor for other ethnicity_mi
languages  how many languages they know
handed  left, right, or ambi
height  height measurement, cm
rightfoot  length of the right foot, mm
armspan  their armspan measurement, cm
wrist  wrist measurement
neck  neck measurement
pliteal  another measurement
indexfinger  index finger measurement
ringfinger  ring finger measurement
hairlength  the length of their hair
travel  travel method used to get to school
timetravel  how long they spend travelling
bagweightraw  the weight of the bag
bagweight  weight of the bag
bagcarry  factor of how they're carrying
favlearning  their favourite subject
favlearningmo  their favourite subject?
memory  a memory score
reaction  a reaction score
sport  what sport they play
sport_en  what sport they play
techtv  binary for use of TV
techmp3  binary for use of mp3
techinternet  binary for use of the internet
techmobinternet  binary for use of mobile internet
techfacebook  binary for use of facebook
techtwitter  binary for use of twitter
techbebo  binary for use of bebo
techmyspace  binary for use of myspace
techskype  binary for use of skype
techconsole  binary for use of a console
technone  binary for use of no technology
cellmonths  how many months they’ve had a cellphone?
onlinemusic  binary for if they listen to music online
onlinevideo  binary for if they watch video online
onlinegame  binary for if they play games online
onlinefriend  binary for if they talk to friends online
onlineschool  binary for if they access school online
onlineother  binary for if they do anything else online
onlinenone  binary for if they do nothing online
bedtime  hours spent in bed
waketime  hours spent awake
favtvshow  the name of their favourite TV show
favtvshow_en  the name of their favourite TV show
importwarm  binary about warm
importpollution  binary about pollution
importrecycling  binary about recycling
importwater  binary about water
importlifestyle  binary about lifestyle
importenergy  binary about energy
importgovern  binary about government
importcomputer  binary about computer
region  number of the region they’re in
year  their school year

Source

http://new.censusatschool.org.nz/
iNZightMR

Create iNZightMR multiple response object (MRO)

Description

Creates a multiple response object (MRO) containing binary response matrix (zeros and ones) as well as the input data source.

Usage

iNZightMR(formula, data, Labels = NULL, inverse = FALSE, ...)

Arguments

- `formula`: formula containing the response variables
- `data`: a data.frame containing response and explanatory variables
- `Labels`: labels for the response categories; by default, the function will attempt to. Can also be the function `substrsplit`, which will detect a common base in the variables (see Details)
- `inverse`: if TRUE, binary responses will be reversed (see details)
- `...`: additional arguments, passed to `model.frame`

Details

The individual response variable names can be detected from the variable name by passing `Labels = substrsplit`. For example, in `ethniceng` and `ethnicmri`, `ethnic` is common to both, so the labels will be `eng` and `mri`.

If a user wants to inverse the response (zeros becomes ones), then pass `inverse = TRUE`. This is useful when the responses are characters (such as "correct" and "wrong", where correct would be given a zero) and the order needs reversing (so that correct is 1 instead).

Value

An `mro` object containing a multiple response binary matrix and input data source

See Also

`barplotMR`, `mroPara`

Examples

```r
mr <- iNZightMR(online ~ onlinegame + onlinevideo + onlinemusic, 
data = census.at.school.5000)

# users can also override the variable names
iNZightMR(online ~ onlinegame + onlinevideo + onlinemusic, 
Labels = c("gaming", "youtube", "spotify"),
```
data = census.at.school.5000
)

moecalc  
Margin of Error Calculation

Description
Computes the margin of error for various objects.

Usage
moecalc(
  x,
  factorname = NULL,
  levelnames = NULL,
  coef.idx = NULL,
  est = NULL,
  ci = NULL,
  base = TRUE,
  basename = "base",
  conf.level = 1.96
)

Arguments
  x the object for which we compute margins of error
  factorname name of factor
  levelnames names of factor levels
  coef.idx index of coefficient to use
  est estimates
  ci confidence intervals
  base baseline
  basename name of baseline
  conf.level level of confidence to use

Details
If x is a model, must have factorname or coefficient index (coef.idx) If input factorname, will compute ErrBars by factorname (for given model) If input coefficient index, will compute ErrBars simply by index only (even they are not factor) If x is ses.moecalc object, will compute ErrBars simply by given ses.moecalc object

Value
  a moecalc object
Examples

```r
fit <- lm(Sepal.Length ~ Species, data = iris)
(mc <- moecalc(fit, "Species"))
summary(mc)
plot(mc)
```

### Description

Calculates required proportions, their differences, variance-covariance matrices, standard errors of differences, and comparison intervals for differences, over all of the data. To compute values over various subsets of another explanatory variable, see `by`.

### Usage

```r
mroPara(obj, conf.levels = 1.96, nonparallel = NULL)
```

### Arguments

- `obj`: an MRO object created by `iNZightMR`
- `conf.levels`: confidence level to use, default is 1.96 for 95% intervals
- `nonparallel`: Should these things be parallel?

### Value

An object of class `mrocalc`

### See Also

- `iNZightMR`

### Examples

```r
mr <- iNZightMR(online ~ onlinegame + onlinevideo + onlinemusic,
                 data = census.at.school.5000)
mrp <- mroPara(mr)
```
### plotcombn

**Description**

Plot of Missing Value combinations

**Usage**

```
plotcombn(obj)
```

**Arguments**

- `obj` a calcmissing object

**Value**

summarised info for plot

**Author(s)**

Junjie Zeng

**Examples**

```
plotcombn(census.at.school.5000[,10:25])
```

---

### seBinprops

**Description**

Compute SEs for Independent Binomial Proportions

**Usage**

```
seBinprops(ns, phats)
```

**Arguments**

- `ns` the number of observations in the independent groups
- `phats` the proportions of TRUE/1’s etc.

**Value**

an `ses.moecalc` object
seCovs

Author(s)

Junjie Zeng

Examples

seBinprops(c(50, 30), c(0.3, 0.7))

seCovs

Compute standard error for covariance matrix

Description

Compute the standard error information for a given covariance matrix.

Usage

seCovs(covs, addbase = FALSE)

Arguments

covs
covariance matrix

addbase
logical, is there a baseline?

Value

an ses.moecalc object

Author(s)

Junjie Zeng

Examples

seCovs(cov(iris[, -5]))
seIndepSes

Description
Returns ses.moecalc for given SEs

Usage
seIndepSes(ses)

Arguments
ses the standard errors

Value
an ses.moecalc object

Author(s)
Junjie Zeng

Examples
seIndepSes(c(0.02, 0.05, 0.1))

seMNprops

Description
SEs for Multinomial Proportions

Usage
seMNprops(n, phat)

Arguments
n the number of observations in each group
phat the estimates proportions for each group

Value
an ses.moecalc object
seMRprops

Author(s)

Junjie Zeng

Examples

```r
gphat <- table(iris$Species) / nrow(iris)
seMNprops(nrow(iris), gphat)
```

---

**seMRprops**  
*Multiple binary response*

---

Description

SE’s for multiple binary response

Usage

```r
seMRprops(obj)
```

Arguments

- **obj**  
something that can be turned into a matrix

Value

- an *ses.moeCalc* object

Author(s)

Junjie Zeng

Examples

```r
x <- data.frame(
  v1 = rbinom(20, 1, 0.8),
  v2 = rbinom(20, 1, 0.3),
  v3 = rbinom(20, 1, 0.5)
)
seMRprops(x)
```
substrsplit  

**Extract Common Name from variables**

---

**Description**

Help mro variables extract common name out

**Usage**

`substrsplit(obj)`

**Arguments**

- `obj`  
  It can be a vector or data frame, however, `substrsplit` is usually used in the `iNZightMR` function.

**Value**

A list with common character and unique variable name respectively

**Examples**

`substrsplit(c("varx", "vary", "varz"))`
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