

Package ‘jmv’

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Type Package

Title The 'jamovi' Analyses

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Description A suite of common statistical methods such as descriptives, t-tests, ANOVAs, regression, correlation matrices, proportion tests, contingency tables, and factor analysis. This package is also useable from the 'jamovi' statistical spreadsheet (see <<https://www.jamovi.org>> for more information).

License GPL (>= 2)

Depends R (>= 3.2)

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ancova	<i>ANCOVA</i>
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Description

Analysis of Covariance

Usage

```
ancova(data, dep, factors = NULL, covs = NULL, modelTerms = NULL,
  ss = "3", effectSize = NULL, contrasts = NULL, plotHAxis = NULL,
  plotSepLines = NULL, plotSepPlots = NULL, postHoc = NULL,
  postHocCorr = list("tukey"), descStats = FALSE, homo = FALSE,
  qq = FALSE, plotError = "ci", ciWidth = 95)
```

Arguments

data	the data as a data frame
dep	a string naming the dependent variable from data, variable must be numeric
factors	a vector of strings naming the fixed factors from data
covs	a vector of strings naming the covariates from data
modelTerms	a list of character vectors describing the terms to go into the model
ss	'1', '2' or '3' (default), the sum of squares to use
effectSize	one or more of 'eta', 'partEta', or 'omega'; use eta ² , partial eta ² , and omega ² effect sizes, respectively

contrasts	a list of lists specifying the factor and type of contrast to use, one of 'deviation', 'simple', 'difference', 'helmert', 'repeated' or 'polynomial'
plotHAxis	a string naming the variable placed on the horizontal axis of the plot
plotSepLines	a string naming the variable represented as separate lines on the plot
plotSepPlots	a string naming the variable to separate over to form multiple plots
postHoc	a list of terms to perform post-hoc tests on
postHocCorr	one or more of 'none', 'tukey', 'scheffe', 'bonf', or 'holm'; provide no, Tukey, Scheffe, Bonferroni, and Holm Post Hoc corrections respectively
descStats	TRUE or FALSE (default), provide descriptive statistics
homo	TRUE or FALSE (default), perform homogeneity tests
qq	TRUE or FALSE (default), provide a Q-Q plot of residuals
plotError	'none', 'ci' (default), or 'se'. Use no error bars, use confidence intervals, or use standard errors on the plots, respectively
ciWidth	a number between 50 and 99.9 (default: 95) specifying the confidence interval width

Value

A results object containing:

results\$main	a table of ANCOVA results
results\$model	The underlying aov object
results\$assump\$homo	a table of homogeneity tests
results\$assump\$qq	a q-q plot
results\$contrasts	an array of contrasts tables
results\$postHoc	an array of post-hoc tables
results\$desc	a table of descriptives
results\$descPlot	a descriptives plot
results\$descPlots	an array of descriptives plots

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$main$asDF
as.data.frame(results$main)
```

Examples

```
data('ToothGrowth')

ancova(ToothGrowth, dep = 'len', factors = 'supp', covs = 'dose')

#
# ANCOVA
#
# ANCOVA
```

```

# -----
#           Sum of Squares   df   Mean Square   F       p
# -----
#  supp           205       1       205.4       11.4    0.001
#  dose           2224      1       2224.3      124.0   < .001
#  Residuals      1023      57        17.9
# -----
#

```

anova

ANOVA

Description

Analysis of Variance

Usage

```

anova(data, dep, factors = NULL, modelTerms = NULL, ss = "3",
       effectSize = NULL, contrasts = NULL, plotHAxis = NULL,
       plotSepLines = NULL, plotSepPlots = NULL, postHoc = NULL,
       postHocCorr = list("tukey"), descStats = FALSE, homo = FALSE,
       qq = FALSE, plotError = "ci", ciWidth = 95)

```

Arguments

data	the data as a data frame
dep	a string naming the dependent variable from data, variable must be numeric
factors	a vector of strings naming the fixed factors from data
modelTerms	a list of character vectors describing the terms to go into the model
ss	'1', '2' or '3' (default), the sum of squares to use
effectSize	one or more of 'eta', 'partEta', or 'omega'; use eta ² , partial eta ² , and omega ² effect sizes, respectively
contrasts	a list of lists specifying the factor and type of contrast to use, one of 'deviation', 'simple', 'difference', 'helmert', 'repeated' or 'polynomial'
plotHAxis	a string naming the variable placed on the horizontal axis of the plot
plotSepLines	a string naming the variable represented as separate lines on the plot
plotSepPlots	a string naming the variable to separate over to form multiple plots
postHoc	a list of terms to perform post-hoc tests on
postHocCorr	one or more of 'none', 'tukey', 'scheffe', 'bonf', or 'holm'; provide no, Tukey, Scheffe, Bonferroni, and Holm Post Hoc corrections respectively
descStats	TRUE or FALSE (default), provide descriptive statistics
homo	TRUE or FALSE (default), perform homogeneity tests

qq	TRUE or FALSE (default), provide a Q-Q plot of residuals
plotError	'none', 'ci' (default), or 'se'. Use no error bars, use confidence intervals, or use standard errors on the plots, respectively
ciWidth	a number between 50 and 99.9 (default: 95) specifying the confidence interval width

Value

A results object containing:

results\$main	a table of ANOVA results
results\$model	The underlying aov object
results\$assump\$homo	a table of homogeneity tests
results\$assump\$qq	a q-q plot
results\$contrasts	an array of contrasts tables
results\$postHoc	an array of post-hoc tables
results\$desc	a table of descriptive statistics
results\$descPlot	a descriptives plot
results\$descPlots	an array of descriptives plots

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$main$asDF
as.data.frame(results$main)
```

Examples

```
data('ToothGrowth')

anova(ToothGrowth, dep = 'len', factors = c('dose', 'supp'))

#
# ANOVA
#
# ANOVA
# -----
#           Sum of Squares    df    Mean Square    F      p
# -----
# dose                2426     2        1213.2    92.00 < .001
# supp                 205     1         205.4    15.57 < .001
# dose:supp            108     2          54.2     4.11  0.022
# Residuals           712    54          13.2
# -----
#
```

anovaNP

*One Way ANOVA (Non-parametric)***Description**

Kruskal-Wallis

Usage

anovaNP(data, deps, group, pairs = FALSE)

Arguments

data	the data as a data frame
deps	a string naming the dependent variable in data
group	a string naming the grouping or independent variable in data
pairs	TRUE or FALSE (default), perform pairwise comparisons

Value

A results object containing:

results\$table	a table of the test results
results\$comparisons	an array of pairwise comparison tables

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$table$asDF
as.data.frame(results$table)
```

Examples

```
data('ToothGrowth')

anovaNP(ToothGrowth, deps = 'len', group = 'dose')

#
# ONE-WAY ANOVA (NON-PARAMETRIC)
#
# Kruskal-Wallis
# -----
#           X2    df    p
# -----
#   len   40.7    2    < .001
# -----
#
```

anovaRM

*Repeated Measures ANOVA***Description**

Repeated Measures ANOVA

Usage

```
anovaRM(data, rm = list(list(label = "RM Factor 1", levels = list("Level 1",
  "Level 2"))), rmCells = NULL, bs = NULL, cov = NULL, rmTerms = NULL,
  bsTerms = NULL, ss = "3", effectSize = NULL, spherTests = FALSE,
  spherCorr = list("none"), leveneTest = FALSE, contrasts = NULL,
  postHoc = NULL, postHocCorr = list("tukey"), plotHAxis = NULL,
  plotSepLines = NULL, plotSepPlots = NULL, plotError = "ci",
  ciWidth = 95, descStats = FALSE)
```

Arguments

data	the data as a data frame
rm	a list of lists, where each list describes the label (as a string) and the levels (as vector of strings) of a particular repeated measures factor
rmCells	a list of lists, where each list describes a repeated measure (as a string) from data defined as measure and the particular combination of levels from rm that it belongs to (as a vector of strings) defined as cell
bs	a vector of strings naming the between subjects factors from data
cov	a vector of strings naming the covariates from data. Variables must be numeric
rmTerms	a list of character vectors describing the repeated measures terms to go into the model
bsTerms	a list of character vectors describing the between subjects terms to go into the model
ss	'2' or '3' (default), the sum of squares to use
effectSize	one or more of 'eta', 'partEta', or 'omega'; use eta ² , partial eta ² , and omega ² effect sizes, respectively
spherTests	TRUE or FALSE (default), perform sphericity tests
spherCorr	one or more of 'none' (default), 'GG', or HF; use no p-value correction, the Greenhouse-Geisser p-value correction, and the Huynh-Feldt p-value correction for sphericity, respectively
leveneTest	TRUE or FALSE (default), test for equality of variances (i.e., Levene's test)
contrasts	in development
postHoc	a list of character vectors describing the post-hoc tests that need to be computed
postHocCorr	one or more of 'none', 'tukey' (default), 'scheffe', 'bonf', or 'holm'; use no, Tukey, Scheffe, Bonferroni and Holm posthoc corrections, respectively

plotHAxis	a string naming the variable placed on the horizontal axis of the plot
plotSepLines	a string naming the variable represented as separate lines on the plot
plotSepPlots	a string naming the variable to separate over to form multiple plots
plotError	'none', 'ci' (default), or 'se'. Use no error bars, use confidence intervals, or use standard errors on the plots, respectively
ciWidth	a number between 50 and 99.9 (default: 95) specifying the confidence interval width
descStats	TRUE or FALSE (default), provide descriptive statistics

Value

A results object containing:

results\$rmTable	a table
results\$bsTable	a table
results\$assump\$spherTable	a table
results\$assump\$leveneTable	a table
results\$contrasts	an array of tables
results\$postHoc	an array of tables
results\$descPlot	an image
results\$descPlots	an array of images

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$rmTable$asDF
as.data.frame(results$rmTable)
```

Examples

```
## Not run:

data('bugs', package = 'jmv')

anovaRM(
  data = bugs,
  rm = list(
    list(
      label = 'Frightening',
      levels = c('Low', 'High'))),
  rmCells = list(
    list(
      measure = 'LDLF',
      cell = 'Low'),
    list(
      measure = 'LDHF',
      cell = 'High')),
  rmTerms = list(
    'Frightening'))
```



```

#
# REPEATED MEASURES ANOVA
#
# Within Subjects Effects
# -----
#           Sum of Squares    df    Mean Square    F    p
# -----
#   Frightening             126     1         126.11    44.2  < .001
#   Residual                 257    90           2.85
# -----
#   Note. Type 3 Sums of Squares
#
#
# Between Subjects Effects
# -----
#           Sum of Squares    df    Mean Square    F    p
# -----
#   Residual                 954    90           10.6
# -----
#   Note. Type 3 Sums of Squares
#
## End(Not run)

```

anovaRMNP

Repeated Measures ANOVA (Non-parametric)

Description

Friedman

Usage

```
anovaRMNP(data, measures, pairs = FALSE, desc = FALSE, plots = FALSE,
           plotType = "means")
```

Arguments

data	the data as a data frame
measures	a vector of strings naming the repeated measures variables
pairs	TRUE or FALSE (default), perform pairwise comparisons
desc	TRUE or FALSE (default), provide descriptive statistics
plots	TRUE or FALSE (default), provide a descriptive plot
plotType	'means' (default) or 'medians', the error bars to use in the plot

Value

A results object containing:

results\$table	a table of the Friedman test results
results\$comp	a table of the pairwise comparisons
results\$desc	a table containing the descriptives
results\$plot	a descriptives plot

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$table$asDF
as.data.frame(results$table)
```

Examples

```
data('bugs', package = 'jmv')

anovaRMNP(bugs, measures = c('LDLF', 'LDHF', 'HDLF', 'HDHF'))

#
# REPEATED MEASURES ANOVA (NON-PARAMETRIC)
#
# Friedman
# -----
#   X2    df    p
# -----
#   55.8    3    < .001
# -----
#
```

bugs	<i>data sets</i>
------	------------------

Description

data sets

Author(s)

Ryan, Wilde & Crist (2013)

References

<http://faculty.kutztown.edu/rryan/RESEARCH/PUBS/Ryan,%20Wilde,%20%26%20Crist%202013%20Web%20exp%20vs%20lab.pdf>

cfa

*Confirmatory Factor Analysis***Description**

Confirmatory Factor Analysis

Usage

```
cfa(data, factors = list(list(label = "Factor 1", vars = list())), resCov,
    miss = "fiml", constrain = "facVar", estTest = TRUE, ci = FALSE,
    ciWidth = 95, stdEst = FALSE, factCovEst = TRUE,
    factInterceptEst = FALSE, resCovEst = FALSE, resInterceptEst = FALSE,
    fitMeasures = list("cfi", "tli", "rmsea"), modelTest = TRUE,
    pathDiagram = FALSE, corRes = FALSE, hlCorRes = 0.1, mi = FALSE,
    h1MI = 3)
```

Arguments

data	the data as a data frame
factors	a list containing named lists that define the label of the factor and the vars that belong to that factor
resCov	a list of lists specifying the residual covariances that need to be estimated
miss	'listwise' or 'fiml', how to handle missing values; 'listwise' excludes a row from all analyses if one of its entries is missing, 'fiml' uses a full information maximum likelihood method to estimate the model.
constrain	'facVar' or 'facInd', how to constrain the model; 'facVar' fixes the factor variances to one, 'facInd' fixes each factor to the scale of its first indicator.
estTest	TRUE (default) or FALSE, provide 'Z' and 'p' values for the model estimates
ci	TRUE or FALSE (default), provide a confidence interval for the model estimates
ciWidth	a number between 50 and 99.9 (default: 95) specifying the confidence interval width that is used as 'ci'
stdEst	TRUE or FALSE (default), provide a standardized estimate for the model estimates
factCovEst	TRUE (default) or FALSE, provide estimates for the factor (co)variances
factInterceptEst	TRUE or FALSE (default), provide estimates for the factor intercepts
resCovEst	TRUE (default) or FALSE, provide estimates for the residual (co)variances
resInterceptEst	TRUE or FALSE (default), provide estimates for the residual intercepts
fitMeasures	one or more of 'cfi', 'tli', 'srmr', 'rmsea', 'aic', or 'bic'; use CFI, TLI, SRMR, RMSEA + 90% confidence interval, adjusted AIC, and BIC model fit measures, respectively

modelTest	TRUE (default) or FALSE, provide a chi-square test for exact fit that compares the model with the perfect fitting model
pathDiagram	TRUE or FALSE (default), provide a path diagram of the model
corRes	TRUE or FALSE (default), provide the residuals for the observed correlation matrix (i.e., the difference between the expected correlation matrix and the observed correlation matrix)
hlCorRes	a number (default: 0.1), highlight values in the 'corRes' table above this value
mi	TRUE or FALSE (default), provide modification indices for the parameters not included in the model
hIMI	a number (default: 3), highlight values in the 'modIndices' tables above this value

Value

A results object containing:

results\$factorLoadings	a table containing the factor loadings
results\$factorEst\$factorCov	a table containing factor covariances estimates
results\$factorEst\$factorIntercept	a table containing factor intercept estimates
results\$resEst\$resCov	a table containing residual covariances estimates
results\$resEst\$resIntercept	a table containing residual intercept estimates
results\$modelFit\$test	a table containing the chi-square test for exact fit
results\$modelFit\$fitMeasures	a table containing fit measures
results\$modelPerformance\$corRes	a table containing residuals for the observed correlation matrix
results\$modelPerformance\$modIndices	a group
results\$pathDiagram	an image containing the model path diagram
results\$modelSyntax	the lavaan syntax used to fit the model

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$factorLoadings$asDF
as.data.frame(results$factorLoadings)
```

Examples

```
data <- lavaan::HolzingerSwineford1939

jmv::cfa(
  data = data,
  factors = list(
    list(label="Visual", vars=c("x1", "x2", "x3")),
    list(label="Textual", vars=c("x4", "x5", "x6")),
    list(label="Speed", vars=c("x7", "x8", "x9")),
    resCov = NULL)

#
# CONFIRMATORY FACTOR ANALYSIS
```

```

#
# Factor Loadings
# -----
#   Factor   Indicator   Estimate   SE       Z       p
# -----
#   Visual   x1             0.900     0.0832   10.81    < .001
#           x2             0.498     0.0808    6.16    < .001
#           x3             0.656     0.0776    8.46    < .001
#   Textual  x4             0.990     0.0567   17.46    < .001
#           x5             1.102     0.0626   17.60    < .001
#           x6             0.917     0.0538   17.05    < .001
#   Speed    x7             0.619     0.0743    8.34    < .001
#           x8             0.731     0.0755    9.68    < .001
#           x9             0.670     0.0775    8.64    < .001
# -----
#
#
# FACTOR ESTIMATES
#
# Factor Covariances
# -----
#           Estimate   SE       Z       p
# -----
#   Visual   Visual   1.000 a
#           Textual  0.459     0.0635    7.22    < .001
#           Speed    0.471     0.0862    5.46    < .001
#   Textual  Textual  1.000 a
#           Speed    0.283     0.0715    3.96    < .001
#   Speed    Speed    1.000 a
# -----
#   a fixed parameter
#
#
# MODEL FIT
#
# Test for Exact Fit
# -----
#   X2   df   p
# -----
#   85.3   24   < .001
# -----
#
#
# Fit Measures
# -----
#   CFI    TLI    RMSEA   Lower   Upper
# -----
#   0.931   0.896   0.0921  0.0714  0.114
# -----
#
#

```

contTables	<i>Contingency Tables</i>
------------	---------------------------

Description

X² test of association

Usage

```
contTables(data, rows, cols, counts = NULL, layers = NULL, chiSq = TRUE,
  chiSqCorr = FALSE, likeRat = FALSE, fisher = FALSE, contCoef = FALSE,
  phiCra = FALSE, logOdds = FALSE, odds = FALSE, relRisk = FALSE,
  ci = TRUE, ciWidth = 95, gamma = FALSE, taub = FALSE, exp = FALSE,
  pcRow = FALSE, pcCol = FALSE, pcTot = FALSE)
```

Arguments

data	the data as a data frame
rows	a string naming the variable to use as the rows in the contingency table
cols	a string naming the variable to use as the columns in the contingency table
counts	a string naming the variable to use as counts, or NULL if each row represents a single observation
layers	a character vector naming variables to split the contingency table across
chiSq	TRUE (default) or FALSE, provide X ²
chiSqCorr	TRUE or FALSE (default), provide X ² with continuity correction
likeRat	TRUE or FALSE (default), provide the likelihood ratio
fisher	TRUE or FALSE (default), provide Fisher's exact test
contCoef	TRUE or FALSE (default), provide the contingency coefficient
phiCra	TRUE or FALSE (default), provide Phi and Cramer's V
logOdds	TRUE or FALSE (default), provide the log odds ratio (only available for 2x2 tables)
odds	TRUE or FALSE (default), provide the odds ratio (only available for 2x2 tables)
relRisk	TRUE or FALSE (default), provide the relative risk (only available for 2x2 tables)
ci	TRUE or FALSE (default), provide confidence intervals for the comparative measures
ciWidth	a number between 50 and 99.9 (default: 95), width of the confidence intervals to provide
gamma	TRUE or FALSE (default), provide gamma
taub	TRUE or FALSE (default), provide Kendall's tau-b
exp	TRUE or FALSE (default), provide the expected counts
pcRow	TRUE or FALSE (default), provide row percentages
pcCol	TRUE or FALSE (default), provide column percentages
pcTot	TRUE or FALSE (default), provide total percentages

Value

A results object containing:

results\$freqs	a table of proportions
results\$chiSq	a table of X^2 test results
results\$odds	a table of comparative measures
results\$nom	a table of the 'nominal' test results
results\$gamma	a table of the gamma test results
results\$taub	a table of the Kendall's tau-b test results

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$freqs$asDF
as.data.frame(results$freqs)
```

Examples

```
data('HairEyeColor')
dat <- as.data.frame(HairEyeColor)

contTables(dat, rows = 'Hair', cols = 'Eye', counts = 'Freq')
```

```
#
# CONTINGENCY TABLES
#
# Contingency Tables
# -----
#   Hair      Brown   Blue   Hazel   Green   Total
# -----
#   Black      68     20     15     5     108
#   Brown     119     84     54     29     286
#   Red        26     17     14     14     71
#   Blond       7     94     10     16     127
#   Total     220    215     93     64     592
# -----
#
#
# X2 Tests
# -----
#           Value   df    p
# -----
#   X2      138     9   < .001
#   N         592
# -----
#
```

contTablesPaired *Paired Samples Contingency Tables*

Description

McNemar test

Usage

```
contTablesPaired(data, rows, cols, counts = NULL, chiSq = TRUE,
  chiSqCorr = FALSE, exact = FALSE, pcRow = FALSE, pcCol = FALSE)
```

Arguments

data	the data as a data frame
rows	a string naming the variable to use as the rows in the contingency table
cols	a string naming the variable to use as the columns in the contingency table
counts	a string naming the variable to use as counts, or NULL if each row represents a single observation
chiSq	TRUE (default) or FALSE, provide X^2
chiSqCorr	TRUE or FALSE (default), provide X^2 with continuity correction
exact	TRUE or FALSE (default), provide an exact log odds ratio
pcRow	TRUE or FALSE (default), provide row percentages
pcCol	TRUE or FALSE (default), provide column percentages

Value

A results object containing:

results\$freqs	a proportions table
results\$test	a table of test results

Tables can be converted to data frames with asDF or [as.data.frame](#). For example:

```
results$freqs$asDF
as.data.frame(results$freqs)
```

Examples

```
dat <- data.frame(
  `1st survey` = c('Approve', 'Approve', 'Disapprove', 'Disapprove'),
  `2nd survey` = c('Approve', 'Disapprove', 'Approve', 'Disapprove'),
  `Counts` = c(794, 150, 86, 570),
  check.names=FALSE)
```

```

contTablesPaired(dat, rows = '1st survey', cols = '2nd survey', counts = 'Counts')

#
# PAIRED SAMPLES CONTINGENCY TABLES
#
# Contingency Tables
# -----
#   1st survey   Approve   Disapprove   Total
# -----
#   Approve      794      150         944
#   Disapprove   86        570         656
#   Total        880      720        1600
# -----
#
#
# McNemar Test
# -----
#                               Value   df   p
# -----
#   X2                          17.4    1   < .001
#   X2 continuity correction    16.8    1   < .001
# -----
#

```

corrMatrix

Correlation Matrix

Description

Correlation Matrix

Usage

```

corrMatrix(data, vars, pearson = TRUE, spearman = FALSE, kendall = FALSE,
  sig = TRUE, flag = FALSE, ci = FALSE, ciWidth = 95, plots = FALSE,
  plotDens = FALSE, plotStats = FALSE, hypothesis = "corr")

```

Arguments

data	the data as a data frame
vars	a vector of strings naming the variables to correlate in data
pearson	TRUE (default) or FALSE, provide Pearson's R
spearman	TRUE or FALSE (default), provide Spearman's rho
kendall	TRUE or FALSE (default), provide Kendall's tau-b
sig	TRUE (default) or FALSE, provide significance levels
flag	TRUE or FALSE (default), flag significant correlations

ci	TRUE or FALSE (default), provide confidence intervals
ciWidth	a number between 50 and 99.9 (default: 95), the width of confidence intervals to provide
plots	TRUE or FALSE (default), provide a correlation matrix plot
plotDens	TRUE or FALSE (default), provide densities in the correlation matrix plot
plotStats	TRUE or FALSE (default), provide statistics in the correlation matrix plot
hypothesis	one of 'corr' (default), 'pos', 'neg' specifying the alternative hypothesis; correlated, correlated positively, correlated negatively respectively.

Value

A results object containing:

results\$matrix	a correlation matrix table
results\$plot	a correlation matrix plot

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$matrix$asDF
as.data.frame(results$matrix)
```

Examples

```
## Not run:
data('mtcars')

corrMatrix(mtcars, vars = c('mpg', 'cyl', 'disp', 'hp'))

#
# CORRELATION MATRIX
#
# Correlation Matrix
# -----
#                mpg      cyl      disp      hp
# -----
# mpg  Pearson's r      -0.852  -0.848  -0.776
#      p-value          < .001  < .001  < .001
#
# cyl  Pearson's r              0.902   0.832
#      p-value              < .001  < .001
#
# disp  Pearson's r              0.791
#      p-value              < .001
#
# hp    Pearson's r
#      p-value
# -----
#
```

```
## End(Not run)
```

 descriptives

Descriptives

Description

Provides a range of descriptive statistics

Usage

```
descriptives(data, vars, splitBy = NULL, freq = FALSE, hist = FALSE,
  dens = FALSE, bar = FALSE, barCounts = FALSE, box = FALSE,
  violin = FALSE, dot = FALSE, dotType = "jitter", n = TRUE,
  missing = TRUE, mean = TRUE, median = TRUE, mode = FALSE,
  sum = FALSE, sd = FALSE, variance = FALSE, range = FALSE,
  min = TRUE, max = TRUE, se = FALSE, skew = FALSE, kurt = FALSE,
  quart = FALSE, pcEqGr = FALSE, pcNEqGr = 4)
```

Arguments

data	the data as a data frame
vars	a vector of strings naming the variables of interest in data
splitBy	a vector of strings naming the variables used to split vars
freq	TRUE or FALSE (default), provide frequency tables (nominal, ordinal variables only)
hist	TRUE or FALSE (default), provide histograms (continuous variables only)
dens	TRUE or FALSE (default), provide density plots (continuous variables only)
bar	TRUE or FALSE (default), provide bar plots (nominal, ordinal variables only)
barCounts	TRUE or FALSE (default), add counts to the bar plots
box	TRUE or FALSE (default), provide box plots (continuous variables only)
violin	TRUE or FALSE (default), provide violin plots (continuous variables only)
dot	TRUE or FALSE (default), provide dot plots (continuous variables only)
dotType	.
n	TRUE (default) or FALSE, provide the sample size
missing	TRUE (default) or FALSE, provide the number of missing values
mean	TRUE (default) or FALSE, provide the mean
median	TRUE (default) or FALSE, provide the median
mode	TRUE or FALSE (default), provide the mode
sum	TRUE or FALSE (default), provide the sum
sd	TRUE or FALSE (default), provide the standard deviation

variance	TRUE or FALSE (default), provide the variance
range	TRUE or FALSE (default), provide the range
min	TRUE or FALSE (default), provide the minimum
max	TRUE or FALSE (default), provide the maximum
se	TRUE or FALSE (default), provide the standard error
skew	TRUE or FALSE (default), provide the skewness
kurt	TRUE or FALSE (default), provide the kurtosis
quart	TRUE or FALSE (default), provide quartiles
pcEqGr	TRUE or FALSE (default), provide quantiles
pcNEqGr	an integer (default: 4) specifying the number of equal groups

Value

A results object containing:

results\$descriptives	a table of the descriptive statistics
results\$frequencies	an array of frequency tables
results\$plots	an array of descriptive plots

Tables can be converted to data frames with asDF or [as.data.frame](#). For example:

```
results$descriptives$asDF
as.data.frame(results$descriptives)
```

Examples

```
## Not run:
data('mtcars')
dat <- mtcars

# frequency tables can be provided for factors
dat$gear <- as.factor(dat$gear)

descriptives(dat, vars = c('mpg', 'cyl', 'disp', 'gear'), freq = TRUE)

#
# DESCRIPTIVES
#
# Descriptives
# -----
#           mpg      cyl      disp      gear
# -----
# N           32       32       32       32
# Missing      0        0        0        0
# Mean       20.1     6.19     231     3.69
# Median     19.2     6.00     196     4.00
# Minimum    10.4     4.00     71.1     3
```

```

#   Maximum   33.9   8.00   472   5
# -----
#
#
# FREQUENCIES
#
# Frequencies of gear
# -----
#   Levels   Counts
# -----
#     3         15
#     4         12
#     5          5
# -----
#
## End(Not run)

```

efa

Exploratory Factor Analysis

Description

Exploratory Factor Analysis

Usage

```

efa(data, vars, nFactorMethod = "parallel", nFactors = 1, minEigen = 1,
     rotation = "oblimin", hideLoadings = 0.3, screePlot = FALSE,
     eigen = FALSE, factorCor = FALSE, factorSummary = FALSE,
     modelFit = FALSE, kmo = FALSE, bartlett = FALSE)

```

Arguments

data	the data as a data frame
vars	a vector of strings naming the variables of interest in data
nFactorMethod	'parallel' (default), 'eigen' or 'fixed', the way to determine the number of factors
nFactors	an integer (default: 1), the number of factors in the model
minEigen	a number (default: 1), the minimal eigenvalue for a factor to be included in the model
rotation	'none', 'varimax' (default), 'quartimax', 'promax', 'oblimin', or 'simplimax', the rotation to use in estimation
hideLoadings	a number (default: 0.3), hide loadings below this value
screePlot	TRUE or FALSE (default), show scree plot
eigen	TRUE or FALSE (default), show eigenvalue table

factorCor	TRUE or FALSE (default), show factor correlations
factorSummary	TRUE or FALSE (default), show factor summary
modelFit	TRUE or FALSE (default), show model fit measures and test
kmo	TRUE or FALSE (default), show Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA) results
bartlett	TRUE or FALSE (default), show Bartlett's test of sphericity results

Value

A results object containing:

results\$text a preformatted

Examples

```
data('iris')

efa(iris, vars = c('Sepal.Length', 'Sepal.Width', 'Petal.Length', 'Petal.Width'))

#
# EXPLORATORY FACTOR ANALYSIS
#
# Factor Loadings
# -----
#           1      2      Uniqueness
# -----
# Sepal.Length  0.993      0.10181
# Sepal.Width   0.725      0.42199
# Petal.Length  0.933      0.00483
# Petal.Width   0.897      0.07088
# -----
# Note. 'oblimin' rotation was used
#
```

linReg *Linear Regression*

Description

Linear Regression

Usage

```
linReg(data, dep, covs = NULL, factors = NULL, blocks = list(list()),
refLevels = NULL, r = TRUE, r2 = TRUE, r2Adj = FALSE, aic = FALSE,
bic = FALSE, rmse = FALSE, modelTest = FALSE, anova = FALSE,
```

```

ci = FALSE, ciWidth = 95, stdEst = FALSE, ciStdEst = FALSE,
ciWidthStdEst = 95, coefPlot = FALSE, qqPlot = FALSE,
resPlots = FALSE, durbin = FALSE, collin = FALSE, cooks = FALSE,
emMeans = list(list()), ciEmm = TRUE, ciWidthEmm = 95,
emmPlots = TRUE, emmTables = FALSE, emmWeights = TRUE)

```

Arguments

<code>data</code>	the data as a data frame
<code>dep</code>	a string naming the dependent variable from data, variable must be numeric
<code>covs</code>	a vector of strings naming the covariates from data
<code>factors</code>	a vector of strings naming the fixed factors from data
<code>blocks</code>	a list containing vectors of strings that name the predictors that are added to the model. The elements are added to the model according to their order in the list
<code>refLevels</code>	a list of lists specifying reference levels of the dependent variable and all the factors
<code>r</code>	TRUE (default) or FALSE, provide the statistical measure R for the models
<code>r2</code>	TRUE (default) or FALSE, provide the statistical measure R-squared for the models
<code>r2Adj</code>	TRUE or FALSE (default), provide the statistical measure adjusted R-squared for the models
<code>aic</code>	TRUE or FALSE (default), provide Aikaike's Information Criterion (AIC) for the models
<code>bic</code>	TRUE or FALSE (default), provide Bayesian Information Criterion (BIC) for the models
<code>rmse</code>	TRUE or FALSE (default), provide RMSE for the models
<code>modelTest</code>	TRUE (default) or FALSE, provide the model comparison between the models and the NULL model
<code>anova</code>	TRUE or FALSE (default), provide the omnibus ANOVA test for the predictors
<code>ci</code>	TRUE or FALSE (default), provide a confidence interval for the model coefficients
<code>ciWidth</code>	a number between 50 and 99.9 (default: 95) specifying the confidence interval width
<code>stdEst</code>	TRUE or FALSE (default), provide a standardized estimate for the model coefficients
<code>ciStdEst</code>	TRUE or FALSE (default), provide a confidence interval for the model coefficient standardized estimates
<code>ciWidthStdEst</code>	a number between 50 and 99.9 (default: 95) specifying the confidence interval width
<code>coefPlot</code>	TRUE or FALSE (default), provide a coefficient plot where for each predictor the estimated coefficient and confidence intervals are plotted.
<code>qqPlot</code>	TRUE or FALSE (default), provide a Q-Q plot of residuals
<code>resPlots</code>	TRUE or FALSE (default), provide residual plots where the dependent variable and each covariate is plotted against the standardized residuals.

durbin	TRUE or FALSE (default), provide results of the Durbin- Watson test for autocorrelation
collin	TRUE or FALSE (default), provide VIF and tolerance collinearity statistics
cooks	TRUE or FALSE (default), provide summary statistics for the Cook's distance
emMeans	a list of lists specifying the variables for which the estimated marginal means need to be calculate. Supports up to three variables per term.
ciEmm	TRUE (default) or FALSE, provide a confidence interval for the estimated marginal means
ciWidthEmm	a number between 50 and 99.9 (default: 95) specifying the confidence interval width for the estimated marginal means
emmPlots	TRUE (default) or FALSE, provide estimated marginal means plots
emmTables	TRUE or FALSE (default), provide estimated marginal means tables
emmWeights	TRUE (default) or FALSE, weigh each cell equally or weigh them according to the cell frequency

Value

A results object containing:

results\$modelFit	a table
results\$modelComp	a table
results\$models	an array of model specific results

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$modelFit$asDF
as.data.frame(results$modelFit)
```

Examples

```
data('Prestige', package='carData')

linReg(data = Prestige, dep = 'income',
       covs = c('education', 'prestige', 'women'),
       blocks = list(list('education', 'prestige', 'women')))
```

```
#
# LINEAR REGRESSION
#
# Model Fit Measures
# -----
#   Model    R      R²
# -----
#       1    0.802  0.643
# -----
#
#
```

```

# MODEL SPECIFIC RESULTS
#
# MODEL 1
#
# Model Coefficients
# -----
# Predictor      Estimate    SE        t        p
# -----
# Intercept      -253.8     1086.16   -0.234   0.816
# women          -50.9       8.56     -5.948   < .001
# prestige       141.4      29.91     4.729   < .001
# education      177.2     187.63     0.944   0.347
# -----
#
#

```

logLinear

Log-Linear Regression

Description

Log-Linear Regression

Usage

```

logLinear(data, factors = NULL, counts = NULL, blocks = list(list()),
  refLevels = NULL, modelTest = FALSE, dev = TRUE, aic = TRUE,
  bic = FALSE, pseudoR2 = list("r2mf"), omni = FALSE, ci = FALSE,
  ciWidth = 95, RR = FALSE, ciRR = FALSE, ciWidthRR = 95,
  emMeans = list(list()), ciEmm = TRUE, ciWidthEmm = 95,
  emmPlots = TRUE, emmTables = FALSE, emmWeights = TRUE)

```

Arguments

data	the data as a data frame
factors	a vector of strings naming the factors from data
counts	a string naming a variable in data containing counts, or NULL if each row represents a single observation
blocks	a list containing vectors of strings that name the predictors that are added to the model. The elements are added to the model according to their order in the list
refLevels	a list of lists specifying reference levels of the dependent variable and all the factors
modelTest	TRUE or FALSE (default), provide the model comparison between the models and the NULL model
dev	TRUE (default) or FALSE, provide the deviance (or -2LogLikelihood) for the models

aic	TRUE (default) or FALSE, provide Aikaike's Information Criterion (AIC) for the models
bic	TRUE or FALSE (default), provide Bayesian Information Criterion (BIC) for the models
pseudoR2	one or more of 'r2mf', 'r2cs', or 'r2n'; use McFadden's, Cox & Snell, and Nagelkerke pseudo-R ² , respectively
omni	TRUE or FALSE (default), provide the omnibus likelihood ratio tests for the predictors
ci	TRUE or FALSE (default), provide a confidence interval for the model coefficient estimates
ciWidth	a number between 50 and 99.9 (default: 95) specifying the confidence interval width
RR	TRUE or FALSE (default), provide the exponential of the log-rate ratio estimate, or the rate ratio estimate
ciRR	TRUE or FALSE (default), provide a confidence interval for the model coefficient rate ratio estimates
ciWidthRR	a number between 50 and 99.9 (default: 95) specifying the confidence interval width
emMeans	a list of lists specifying the variables for which the estimated marginal means need to be calculate. Supports up to three variables per term.
ciEmm	TRUE (default) or FALSE, provide a confidence interval for the estimated marginal means
ciWidthEmm	a number between 50 and 99.9 (default: 95) specifying the confidence interval width for the estimated marginal means
emmPlots	TRUE (default) or FALSE, provide estimated marginal means plots
emmTables	TRUE or FALSE (default), provide estimated marginal means tables
emmWeights	TRUE (default) or FALSE, weigh each cell equally or weigh them according to the cell frequency

Value

A results object containing:

results\$modelFit	a table
results\$modelComp	a table
results\$models	an array of model specific results

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$modelFit$asDF
```

```
as.data.frame(results$modelFit)
```

Examples

```

data('mtcars')

tab <- table('gear'=mtcars$gear, 'cyl'=mtcars$cyl)
dat <- as.data.frame(tab)

logLinear(data = dat, factors = c("gear", "cyl"), counts = "Freq",
          blocks = list(list("gear", "cyl", c("gear", "cyl"))),
          refLevels = list(
            list(var="gear", ref="3"),
            list(var="cyl", ref="4")))

#
# LOG-LINEAR REGRESSION
#
# Model Fit Measures
# -----
#   Model   Deviance   AIC   R2-McF
# -----
#       1    4.12e-10   41.4    1.000
# -----
#
# MODEL SPECIFIC RESULTS
#
# MODEL 1
#
# Model Coefficients
# -----
#   Predictor      Estimate      SE      Z      p
# -----
#   Intercept      -4.71e-16      1.00    -4.71e-16    1.000
#   gear:
#   4 3              2.079      1.06      1.961    0.050
#   5 3              0.693      1.22      0.566    0.571
#   cyl:
#   6 4              0.693      1.22      0.566    0.571
#   8 4              2.485      1.04      2.387    0.017
#   gear:cyl:
#   (4 3):(6 4)     -1.386      1.37     -1.012    0.311
#   (5 3):(6 4)     -1.386      1.73     -0.800    0.423
#   (4 3):(8 4)    -26.867    42247.17  -6.36e -4    0.999
#   (5 3):(8 4)     -2.485      1.44     -1.722    0.085
# -----
#
#
#

```

Description

Binomial Logistic Regression

Usage

```
logRegBin(data, dep, covs = NULL, factors = NULL, blocks = list(list()),
  refLevels = NULL, modelTest = FALSE, dev = TRUE, aic = TRUE,
  bic = FALSE, pseudoR2 = list("r2mf"), omni = FALSE, ci = FALSE,
  ciWidth = 95, OR = FALSE, ciOR = FALSE, ciWidthOR = 95,
  emmMeans = list(list()), ciEmm = TRUE, ciWidthEmm = 95,
  emmPlots = TRUE, emmTables = FALSE, emmWeights = TRUE, class = FALSE,
  acc = FALSE, spec = FALSE, sens = FALSE, auc = FALSE,
  rocPlot = FALSE, cutOff = 0.5, cutOffPlot = FALSE, collin = FALSE,
  boxTidwell = FALSE, cooks = FALSE)
```

Arguments

data	the data as a data frame
dep	a string naming the dependent variable from data, variable must be a factor
covs	a vector of strings naming the covariates from data
factors	a vector of strings naming the fixed factors from data
blocks	a list containing vectors of strings that name the predictors that are added to the model. The elements are added to the model according to their order in the list
refLevels	a list of lists specifying reference levels of the dependent variable and all the factors
modelTest	TRUE or FALSE (default), provide the model comparison between the models and the NULL model
dev	TRUE (default) or FALSE, provide the deviance (or -2LogLikelihood) for the models
aic	TRUE (default) or FALSE, provide Aikaike's Information Criterion (AIC) for the models
bic	TRUE or FALSE (default), provide Bayesian Information Criterion (BIC) for the models
pseudoR2	one or more of 'r2mf', 'r2cs', or 'r2n'; use McFadden's, Cox & Snell, and Nagelkerke pseudo- R^2 , respectively
omni	TRUE or FALSE (default), provide the omnibus likelihood ratio tests for the predictors
ci	TRUE or FALSE (default), provide a confidence interval for the model coefficient estimates
ciWidth	a number between 50 and 99.9 (default: 95) specifying the confidence interval width
OR	TRUE or FALSE (default), provide the exponential of the log-odds ratio estimate, or the odds ratio estimate

ciOR	TRUE or FALSE (default), provide a confidence interval for the model coefficient odds ratio estimates
ciWidthOR	a number between 50 and 99.9 (default: 95) specifying the confidence interval width
emMeans	a list of lists specifying the variables for which the estimated marginal means need to be calculate. Supports up to three variables per term.
ciEmm	TRUE (default) or FALSE, provide a confidence interval for the estimated marginal means
ciWidthEmm	a number between 50 and 99.9 (default: 95) specifying the confidence interval width for the estimated marginal means
emmPlots	TRUE (default) or FALSE, provide estimated marginal means plots
emmTables	TRUE or FALSE (default), provide estimated marginal means tables
emmWeights	TRUE (default) or FALSE, weigh each cell equally or weigh them according to the cell frequency
class	TRUE or FALSE (default), provide a predicted classification table (or confusion matrix)
acc	TRUE or FALSE (default), provide the predicted accuracy of outcomes grouped by the cut-off value
spec	TRUE or FALSE (default), provide the predicted specificity of outcomes grouped by the cut-off value
sens	TRUE or FALSE (default), provide the predicted sensitivity of outcomes grouped by the cut-off value
auc	TRUE or FALSE (default), provide the rea under the ROC curve (AUC)
rocPlot	TRUE or FALSE (default), provide a ROC curve plot
cutOff	TRUE or FALSE (default), set a cut-off used for the predictions
cutOffPlot	TRUE or FALSE (default), provide a cut-off plot
collin	TRUE or FALSE (default), provide VIF and tolerance collinearity statistics
boxTidwell	TRUE or FALSE (default), provide Box-Tidwell test for linearity of the logit
cooks	TRUE or FALSE (default), provide summary statistics for the Cook's distance

Value

A results object containing:

results\$modelFit	a table
results\$modelComp	a table
results\$models	an array of model specific results

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$modelFit$asDF
as.data.frame(results$modelFit)
```

Examples

```

data('birthwt', package='MASS')

dat <- data.frame(
  low = factor(birthwt$low),
  age = birthwt$age,
  bwt = birthwt$bwt)

logRegBin(data = dat, dep = "low",
  covs = c("age", "bwt"),
  blocks = list(list("age", "bwt")),
  refLevels = list(list(var="low", ref="0")))

#
# BINOMIAL LOGISTIC REGRESSION
#
# Model Fit Measures
# -----
#   Model   Deviance   AIC   R2-McF
# -----
#       1     4.97e-7    6.00    1.000
# -----
#
#
# MODEL SPECIFIC RESULTS
#
# MODEL 1
#
# Model Coefficients
# -----
#   Predictor   Estimate     SE       Z       p
# -----
#   Intercept   2974.73225   218237.2   0.0136   0.989
#   age         -0.00653     482.7     -1.35e-5  1.000
#   bwt         -1.18532     87.0      -0.0136   0.989
# -----
#   Note. Estimates represent the log odds of "low = 1"
#   vs. "low = 0"
#
#

```

Description

Multinomial Logistic Regression

Usage

```
logRegMulti(data, dep, covs = NULL, factors = NULL, blocks = list(list()),
  refLevels = NULL, modelTest = FALSE, dev = TRUE, aic = TRUE,
  bic = FALSE, pseudoR2 = list("r2mf"), omni = FALSE, ci = FALSE,
  ciWidth = 95, OR = FALSE, ciOR = FALSE, ciWidthOR = 95,
  emMeans = list(list()), ciEmm = TRUE, ciWidthEmm = 95,
  emmPlots = TRUE, emmTables = FALSE, emmWeights = TRUE)
```

Arguments

data	the data as a data frame
dep	a string naming the dependent variable from data, variable must be a factor
covs	a vector of strings naming the covariates from data
factors	a vector of strings naming the fixed factors from data
blocks	a list containing vectors of strings that name the predictors that are added to the model. The elements are added to the model according to their order in the list
refLevels	a list of lists specifying reference levels of the dependent variable and all the factors
modelTest	TRUE or FALSE (default), provide the model comparison between the models and the NULL model
dev	TRUE (default) or FALSE, provide the deviance (or -2LogLikelihood) for the models
aic	TRUE (default) or FALSE, provide Aikaike's Information Criterion (AIC) for the models
bic	TRUE or FALSE (default), provide Bayesian Information Criterion (BIC) for the models
pseudoR2	one or more of 'r2mf', 'r2cs', or 'r2n'; use McFadden's, Cox & Snell, and Nagelkerke pseudo- R^2 , respectively
omni	TRUE or FALSE (default), provide the omnibus likelihood ratio tests for the predictors
ci	TRUE or FALSE (default), provide a confidence interval for the model coefficient estimates
ciWidth	a number between 50 and 99.9 (default: 95) specifying the confidence interval width
OR	TRUE or FALSE (default), provide the exponential of the log-odds ratio estimate, or the odds ratio estimate
ciOR	TRUE or FALSE (default), provide a confidence interval for the model coefficient odds ratio estimates
ciWidthOR	a number between 50 and 99.9 (default: 95) specifying the confidence interval width
emMeans	a list of lists specifying the variables for which the estimated marginal means need to be calculate. Supports up to three variables per term.

ciEmm	TRUE (default) or FALSE, provide a confidence interval for the estimated marginal means
ciWidthEmm	a number between 50 and 99.9 (default: 95) specifying the confidence interval width for the estimated marginal means
emmPlots	TRUE (default) or FALSE, provide estimated marginal means plots
emmTables	TRUE or FALSE (default), provide estimated marginal means tables
emmWeights	TRUE (default) or FALSE, weigh each cell equally or weigh them according to the cell frequency

Value

A results object containing:

results\$modelFit	a table
results\$modelComp	a table
results\$models	an array of model specific results

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$modelFit$asDF
as.data.frame(results$modelFit)
```

Examples

```
data('birthwt', package='MASS')

dat <- data.frame(
  race = factor(birthwt$race),
  age = birthwt$age,
  low = factor(birthwt$low))

logRegMulti(data = dat, dep = "race",
  covs = "age", factors = "low",
  blocks = list(list("age", "low")),
  refLevels = list(
    list(var="race", ref="1"),
    list(var="low", ref="0")))

#
# MULTINOMIAL LOGISTIC REGRESSION
#
# Model Fit Measures
# -----
#   Model   Deviance   AIC   R2-McF
# -----
#       1         360   372   0.0333
# -----
#
#
```

```

# MODEL SPECIFIC RESULTS
#
# MODEL 1
#
# Model Coefficients
# -----
#   race   Predictor   Estimate   SE       Z       p
# -----
#   2 - 1   Intercept    0.8155    1.1186    0.729   0.466
#           age         -0.1038   0.0487   -2.131   0.033
#           low:
#           1 0         0.7527    0.4700    1.601   0.109
#   3 - 1   Intercept    1.0123    0.7798    1.298   0.194
#           age         -0.0663   0.0324   -2.047   0.041
#           low:
#           1 0         0.5677    0.3522    1.612   0.107
# -----
#
#

```

mancova

MANCOVA

Description

Multivariate Analysis of Covariance

Usage

```

mancova(data, deps, factors = NULL, covs = NULL, multivar = list("pillai",
  "wilks", "hotel", "roy"), boxM = FALSE, shapiro = FALSE, qqPlot = FALSE)

```

Arguments

data	the data as a data frame
deps	a string naming the dependent variable from data, variable must be numeric
factors	a vector of strings naming the factors from data
covs	a vector of strings naming the covariates from data
multivar	one or more of 'pillai', 'wilks', 'hotel', or 'roy'; use Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root multivariate statistics, respectively
boxM	TRUE or FALSE (default), provide Box's M test
shapiro	TRUE or FALSE (default), provide Shapiro-Wilk test
qqPlot	TRUE or FALSE (default), provide a Q-Q plot of multivariate normality

mancova

35

Value

A results object containing:

```

results$multivar      a table
results$univar       a table
results$assump$boxM  a table
results$assump$shapiro a table
results$assump$qqPlot an image

```

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```

results$multivar$asDF
as.data.frame(results$multivar)

```

Examples

```

data('iris')

mancova(data = iris,
  deps = c('Sepal.Length', 'Sepal.Width', 'Petal.Length', 'Petal.Width'),
  factors = 'Species')

#
# MANCOVA
#
# Multivariate Tests
# -----
#              value      F      df1      df2      p
# -----
# Species  Pillai's Trace      1.19    53.5      8    290    < .001
#           Wilks' Lambda      0.0234    199      8    288    < .001
#           Hotelling's Trace    32.5     581      8    286    < .001
#           Roy's Largest Root   32.2    1167      4    145    < .001
# -----
#
# Univariate Tests
# -----
#              Dependent Variable  Sum of Squares  df  Mean Square  F      p
# -----
# Species  Sepal.Length           63.21      2    31.6061    119.3    < .001
#           Sepal.Width           11.34      2     5.6725     49.2    < .001
#           Petal.Length          437.10      2    218.5514   1180.2    < .001
#           Petal.Width           80.41      2     40.2067    960.0    < .001
# Residuals  Sepal.Length           38.96     147     0.2650
#           Sepal.Width           16.96     147     0.1154
#           Petal.Length           27.22     147     0.1852
#           Petal.Width            6.16     147     0.0419
# -----
#

```

pca *Principal Component Analysis*

Description

Principal Component Analysis

Usage

```
pca(data, vars, nFactorMethod = "parallel", nFactors = 1, minEigen = 1,
     rotation = "varimax", hideLoadings = 0.3, screePlot = FALSE,
     eigen = FALSE, factorCor = FALSE, factorSummary = FALSE, kmo = FALSE,
     bartlett = FALSE)
```

Arguments

data	the data as a data frame
vars	a vector of strings naming the variables of interest in data
nFactorMethod	'parallel' (default), 'eigen' or 'fixed', the way to determine the number of factors
nFactors	an integer (default: 1), the number of components in the model
minEigen	a number (default: 1), the minimal eigenvalue for a component to be included in the model
rotation	'none', 'varimax' (default), 'quartimax', 'promax', 'oblimin', or 'simplimax', the rotation to use in estimation
hideLoadings	a number (default: 0.3), hide loadings below this value
screePlot	TRUE or FALSE (default), show scree plot
eigen	TRUE or FALSE (default), show eigenvalue table
factorCor	TRUE or FALSE (default), show factor correlations
factorSummary	TRUE or FALSE (default), show factor summary
kmo	TRUE or FALSE (default), show Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA) results
bartlett	TRUE or FALSE (default), show Bartlett's test of sphericity results

Value

A results object containing:

results\$loadings	a table
results\$factorStats\$factorSummary	a table
results\$factorStats\$factorCor	a table
results\$modelFit\$fit	a table
results\$assump\$bartlett	a table
results\$assump\$kmo	a table

```

results$eigen$initEigen      a table
results$eigen$screePlot     an image

```

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```

results$loadings$asDF
as.data.frame(results$loadings)

```

Examples

```

data('iris')

pca(iris, vars = c('Sepal.Length', 'Sepal.Width', 'Petal.Length', 'Petal.Width'))

#
# PRINCIPAL COMPONENT ANALYSIS
#
# Component Loadings
# -----
#              1          Uniqueness
# -----
# Sepal.Length    0.890         0.2076
# Sepal.Width     -0.460         0.7883
# Petal.Length    0.992         0.0168
# Petal.Width     0.965         0.0688
# -----
# Note. 'varimax' rotation was used
#

```

propTest2

Proportion Test (2 Outcomes)

Description

Binomial test

Usage

```

propTest2(data, vars, areCounts = FALSE, testValue = 0.5,
  hypothesis = "notequal", ci = FALSE, ciWidth = 95, bf = FALSE,
  priorA = 1, priorB = 1, ciBayes = FALSE, ciBayesWidth = 95,
  postPlots = FALSE)

```

Arguments

data	the data as a data frame
vars	a vector of strings naming the variables of interest in data
areCounts	TRUE or FALSE (default), the variables are counts
testValue	a number (default: 0.5), the value for the null hypothesis
hypothesis	'notequal' (default), 'greater' or 'less', the alternative hypothesis
ci	TRUE or FALSE (default), provide confidence intervals
ciWidth	a number between 50 and 99.9 (default: 95), the confidence interval width
bf	TRUE or FALSE (default), provide Bayes factors
priorA	a number (default: 1), the beta prior 'a' parameter
priorB	a number (default: 1), the beta prior 'b' parameter
ciBayes	TRUE or FALSE (default), provide Bayesian credible intervals
ciBayesWidth	a number between 50 and 99.9 (default: 95), the credible interval width
postPlots	TRUE or FALSE (default), provide posterior plots

Value

A results object containing:

results\$table	a table of the proportions and test results
results\$postPlots	an array of the posterior plots

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$table$asDF
as.data.frame(results$table)
```

Examples

```
## Not run:
dat <- data.frame(x=c(8, 15))

propTest2(dat, vars = 'x', areCounts = TRUE)

#
# PROPORTION TEST (2 OUTCOMES)
#
# Binomial Test
# -----
#      Level   Count   Total   Proportion   p
# -----
# x      1         8      23      0.348      0.210
#       2        15      23      0.652      0.210
# -----
# Note. Ha is proportion != 0.5
```

```
#
## End(Not run)
```

propTestN *Proportion Test (N Outcomes)*

Description

X² Goodness of fit

Usage

```
propTestN(data, var, counts = NULL, expected = FALSE, ratio = NULL)
```

Arguments

data	the data as a data frame
var	a string naming the variable of interest in data
counts	a string naming a variable in data containing counts, or NULL if each row represents a single observation
expected	TRUE or FALSE (default), whether expected counts should be displayed
ratio	a vector of numbers: the expected proportions

Value

A results object containing:

results\$props	a table of the proportions
results\$tests	a table of the test results

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$props$asDF
as.data.frame(results$props)
```

Examples

```
data('HairEyeColor')
dat <- as.data.frame(HairEyeColor)

propTestN(dat, var = 'Eye', counts = 'Freq', ratio = c(1,1,1,1))

#
# PROPORTION TEST (N OUTCOMES)
#
```



```

# Proportions
# -----
#   Level   Count   Proportion
# -----
#   Brown    220     0.372
#   Blue     215     0.363
#   Hazel    93      0.157
#   Green    64      0.108
# -----
#
#
# X2 Goodness of Fit
# -----
#   X2   df   p
# -----
#   133    3   < .001
# -----
#

```

reliability

*Reliability Analysis***Description**

Reliability Analysis

Usage

```

reliability(data, vars, alphaScale = TRUE, omegaScale = FALSE,
  meanScale = FALSE, sdScale = FALSE, corPlot = FALSE,
  alphaItems = FALSE, omegaItems = FALSE, meanItems = FALSE,
  sdItems = FALSE, itemRestCor = FALSE, revItems = NULL)

```

Arguments

data	the data as a data frame
vars	a vector of strings naming the variables of interest in data
alphaScale	TRUE (default) or FALSE, provide Cronbach's alpha
omegaScale	TRUE or FALSE (default), provide McDonald's omega
meanScale	TRUE or FALSE (default), provide the mean
sdScale	TRUE or FALSE (default), provide the standard deviation
corPlot	TRUE or FALSE (default), provide a correlation plot
alphaItems	TRUE or FALSE (default), provide what the Cronbach's alpha would be if the item was dropped
omegaItems	TRUE or FALSE (default), provide what the McDonald's omega would be if the item was dropped

meanItems	TRUE or FALSE (default), provide item means
sdItems	TRUE or FALSE (default), provide item standard deviations
itemRestCor	TRUE or FALSE (default), provide item-rest correlations
revItems	a vector containing strings naming the variables that are reverse scaled

Value

A results object containing:

results\$scale	a table
results\$items	a table
results\$corPlot	an image

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$scale$asDF
as.data.frame(results$scale)
```

Examples

```
data('iris')

reliability(iris, vars = c('Sepal.Length', 'Sepal.Width', 'Petal.Length', 'Petal.Width'),
            omegaScale = TRUE)

#
# RELIABILITY ANALYSIS
#
# Scale Reliability Statistics
# -----
#              Cronbach's alpha   McDonald's omega
# -----
#   scale              0.708           0.848
# -----
#
```

ttestIS

Independent Samples T-Test

Description

Independent Samples T-Test

Usage

```
ttestIS(data, vars, group, students = TRUE, bf = FALSE, bfPrior = 0.707,
        welchs = FALSE, mann = FALSE, hypothesis = "different", norm = FALSE,
        eqv = FALSE, meanDiff = FALSE, effectSize = FALSE, ci = FALSE,
        ciWidth = 95, desc = FALSE, plots = FALSE, miss = "perAnalysis")
```

Arguments

data	the data as a data frame
vars	a vector of strings naming the dependent variables
group	a string naming the grouping variable, must have 2 levels
students	TRUE (default) or FALSE, perform Student's t-tests
bf	TRUE or FALSE (default), provide Bayes factors
bfPrior	a number between 0.5 and 2 (default 0.707), the prior width to use in calculating Bayes factors
welchs	TRUE or FALSE (default), perform Welch's t-tests
mann	TRUE or FALSE (default), perform Mann-Whitney U tests
hypothesis	'different' (default), 'oneGreater' or 'twoGreater', the alternative hypothesis; group 1 different to group 2, group 1 greater than group 2, and group 2 greater than group 1 respectively
norm	TRUE or FALSE (default), perform Shapiro-Wilk test of normality
eqv	TRUE or FALSE (default), perform Levene's test for equality of variances
meanDiff	TRUE or FALSE (default), provide means and standard errors
effectSize	TRUE or FALSE (default), provide effect sizes
ci	TRUE or FALSE (default), provide confidence intervals
ciWidth	a number between 50 and 99.9 (default: 95), the width of confidence intervals
desc	TRUE or FALSE (default), provide descriptive statistics
plots	TRUE or FALSE (default), provide descriptive plots
miss	'perAnalysis' or 'listwise', how to handle missing values; 'perAnalysis' excludes missing values for individual dependent variables, 'listwise' excludes a row from all analyses if one of its entries is missing.

Value

A results object containing:

results\$ttest	a table containing the t-test results
results\$assum\$norm	a table containing the normality tests
results\$assum\$eqv	a table containing the equality of variances tests
results\$desc	a table containing the group descriptives
results\$plots	an array of the descriptive plots

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$ttest$asDF
as.data.frame(results$ttest)
```

Examples

```
data('ToothGrowth')

ttestIS(data = ToothGrowth, vars = 'len', group = 'supp')

#
# INDEPENDENT SAMPLES T-TEST
#
# Independent Samples T-Test
# -----
#
#                statistic    df      p
# -----
# len  Student's t      1.92  58.0  0.060
# -----
#
#
```

ttestOneS

One Sample T-Test

Description

One Sample T-Test

Usage

```
ttestOneS(data, vars, students = TRUE, bf = FALSE, bfPrior = 0.707,
  mann = FALSE, testValue = 0, hypothesis = "dt", norm = FALSE,
  meanDiff = FALSE, effectSize = FALSE, ci = FALSE, ciWidth = 95,
  desc = FALSE, plots = FALSE, miss = "perAnalysis")
```

Arguments

<code>data</code>	the data as a data frame
<code>vars</code>	a vector of strings naming the variables of interest in data
<code>students</code>	TRUE (default) or FALSE, perform Student's t-tests
<code>bf</code>	TRUE or FALSE (default), provide Bayes factors
<code>bfPrior</code>	a number between 0.5 and 2 (default 0.707), the prior width to use in calculating Bayes factors
<code>mann</code>	TRUE or FALSE (default), perform Mann-Whitney U test
<code>testValue</code>	a number specifying the value of the null hypothesis

hypothesis	'dt' (default), 'gt' or 'lt', the alternative hypothesis; different to testValue, greater than testValue, and less than testValue respectively
norm	TRUE or FALSE (default), perform Shapiro-wilk tests of normality
meanDiff	TRUE or FALSE (default), provide means and standard deviations
effectSize	TRUE or FALSE (default), provide effect sizes
ci	TRUE or FALSE (default), provide confidence intervals
ciWidth	a number between 50 and 99.9 (default: 95), the width of confidence intervals
desc	TRUE or FALSE (default), provide descriptive statistics
plots	TRUE or FALSE (default), provide descriptive plots
miss	'perAnalysis' or 'listwise', how to handle missing values; 'perAnalysis' excludes missing values for individual dependent variables, 'listwise' excludes a row from all analyses if one of its entries is missing.

Value

A results object containing:

results\$ttest	a table containing the t-test results
results\$normality	a table containing the normality test results
results\$descriptives	a table containing the descriptives
results\$plots	an image of the descriptive plots

Tables can be converted to data frames with `asDF` or `as.data.frame`. For example:

```
results$ttest$asDF
as.data.frame(results$ttest)
```

Examples

```
data('ToothGrowth')

ttestOneS(ToothGrowth, vars = c('len', 'dose'))

#
# ONE SAMPLE T-TEST
#
# One Sample T-Test
# -----
#               statistic    df    p
# -----
# len   Student's t      19.1  59.0 < .001
# dose  Student's t      14.4  59.0 < .001
# -----
#
#
```

ttestPS

*Paired Samples T-Test***Description**

Paired Samples T-Test

Usage

```
ttestPS(data, pairs, students = TRUE, bf = FALSE, bfPrior = 0.707,
        wilcoxon = FALSE, hypothesis = "different", norm = FALSE,
        meanDiff = FALSE, effectSize = FALSE, ci = FALSE, ciWidth = 95,
        desc = FALSE, plots = FALSE, miss = "perAnalysis")
```

Arguments

data	the data as a data frame
pairs	a list of lists specifying the pairs of measurement in data
students	TRUE (default) or FALSE, perform Student's t-tests
bf	TRUE or FALSE (default), provide Bayes factors
bfPrior	a number between 0.5 and 2 (default 0.707), the prior width to use in calculating Bayes factors
wilcoxon	TRUE or FALSE (default), perform Wilcoxon signed rank tests
hypothesis	'different' (default), 'oneGreater' or 'twoGreater', the alternative hypothesis; group 1 different to group 2, group 1 greater than group 2, and group 2 greater than group 1 respectively
norm	TRUE or FALSE (default), perform Shapiro-wilk normality tests
meanDiff	TRUE or FALSE (default), provide means and standard errors
effectSize	TRUE or FALSE (default), provide effect sizes
ci	TRUE or FALSE (default), provide confidence intervals
ciWidth	a number between 50 and 99.9 (default: 95), the width of confidence intervals
desc	TRUE or FALSE (default), provide descriptive statistics
plots	TRUE or FALSE (default), provide descriptive plots
miss	'perAnalysis' or 'listwise', how to handle missing values; 'perAnalysis' excludes missing values for individual dependent variables, 'listwise' excludes a row from all analyses if one of its entries is missing.

Value

A results object containing:

results\$ttest	a table containing the t-test results
results\$norm	a table containing the normality test results
results\$desc	a table containing the descriptives
results\$plots	an array of the descriptive plots

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