Package ‘midrangeMCP’

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Type   Package
Title  Multiples Comparisons Procedures Based on Studentized Midrange and Range Distributions
Version 3.1.1
Description Apply tests of multiple comparisons based on studentized 'midrange' and 'range' distributions. The tests are: Tukey Midrange ('TM' test), Student-Newman-Keuls Midrange ('SNKM' test), Means Grouping Midrange ('MGM' test) and Means Grouping Range ('MGR' test). The first two tests were published by Batista and Ferreira (2020) <doi:10.1590/1413-7054202044008020>. The last two are being published.

Imports stats, utils, graphics, grDevices, SMR, writexl, xtable, tcltk
Suggests tkrplot, testthat, knitr, rmarkdown, covr
License GPL (>= 2)


BugReports https://github.com/bendeivide/midrangeMCP/issues

LazyData TRUE
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NeedsCompilation no

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**guimidrangeMCP**

*Graphical User Interface for midrangeMCP function*

**Description**

`guimidrangeMCP` A Graphical User Interface (GUI) for function that returns the MGM, MGR, SNKM and TM tests

**Usage**

`guimidrangeMCP(gui = TRUE)`

**Arguments**

- `gui` Logical argument, TRUE or FALSE. The default is TRUE

**Value**

`guimidrangeMCP` presents a GUI for the results of the four multiple comparison procedures MGM, MGR, SNKM and TM tests. In addition, the GUI returns a graph of the results, as well as the export of these results to three types of file extension and latex code.

**Examples**

```r
# Loading package
library(midrangeMCP)
if (interactive()) {
  guimidrangeMCP(gui = FALSE)
}
```
MRbarplot

Plotting the result of the multiple comparison procedures

Description

MRbarplot creates a bar plot with vertical or horizontal bars to compare the mean treatments by the tests: means grouping based on midrange, means grouping based on range, Student-Newman-Keuls and Tukey based on midrange.

Usage

MRbarplot(x, MCP = "all", col = grDevices::heat.colors(10), horiz = FALSE, ...)

Arguments

x
An object of the MRtest function

MCP
Allows choosing the multiple comparison test. The default is "all". This option will perform all tests available in the MRtest object.

col
A specification for the plotting color. The default is heat.colors(10).

horiz
a logical value. If FALSE, the bars are drawn vertically with the first bar to the left. If TRUE, the bars are drawn horizontally with the first at the bottom.

... Parameters of the barplot function

Details

The MCP argument allows choosing several tests of multiple comparisons from the MRtest object. For plots in papers, use col = gray.colors(10). For details, see colors function.

Value

MRbarplot return the bar plot of the tests chosen ("MGM", "MGR", "SNKM" and "TM") to evaluate the treatment means.

Examples

# Simulated data (completely randomized design)

rv <- c(100.08, 105.66, 97.64, 100.11, 102.60, 121.29, 100.80,
       99.11, 104.43, 122.18, 119.49, 124.37, 123.19, 134.16,
       125.67, 128.88, 148.07, 134.27, 151.53, 127.31)

treat <- factor(rep(LETTERS[1:5], each = 4))

# Anova
res <- aov(rv ~ treat)
# Loading the midrangeMCP package
library(midrangeMCP)

# Choosing tests
results <- MRtest(y = res, trt = "treat", alpha = 0.05,
                  main = "Multiple Comparison Procedures",
                  MCP = c("MGM", "TM"))

MRbarplot(results, MCP = "all") # It will be shown two
# graphs. First, for the
# results of \code{MGM}
# and the second for the
# results of \code{TM}.

MRbarplot(results, MCP = "MGM") # It will be shown
# only the graph
# for the result of
# \code{MGM}

# Plot for papers
MRbarplot(results, MCP = "all", col = gray.colors(10))

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**MRtest**

*Multiple comparison procedures to the means of a factor using the studentized range and midrange distributions.*

**Description**

**MRtest** applies the Means grouping based on midrange, Means Grouping based on Range, Student-Newman-Keuls based on midrange and Tukey based on midrange tests. These are new tests for multiple comparisons proposed by the authors (BATISTA, 2016), that are being published.

**Usage**

```r
MRtest(
  y,
  trt = NULL,
  dferror = NULL,
  mserror = NULL,
  replication = NULL,
  alpha = 0.05,
  main = NULL,
  MCP = "all",
  ismean = FALSE
)
```
Args

y  Model (aov or lm), numeric vector containing the response variable or the mean of
    the treatments.
trt Constant (y = model) or a vector containing the treatments.
dferror Degrees of freedom of the Mean Square Error.
mserror Mean Square Error.
replication Number de repetitions of the treatments in the experiment. For unbalanced data
    should be informed the harmonic mean of repetitions. This argument should be
    informed only if ismean = TRUE.
alpha Significant level. The default is alpha = 0.05.
main Title of the analysis.
MCP Allows choosing the multiple comparison test; the default is "all". This option
    will go perform all tests. However, the options are: the Means grouping based
    on midrange test ("MGM"), Means Grouping based on Range test ("MGR"), the
    Student-Newman-Keuls based on midrange test ("SNKM") and the Tukey based
    on midrange test ("TM").
ismean Logic. If FALSE (default), the y argument represents a model (aov or lm) or a nu-
    meric vector containing the response variable. If TRUE the y argument represents
    the mean of treatments.

Details

The MCP argument allows you to choose various tests of multiple comparisons at once. For example,
MCP = c("MGM", "MGR"), and so on.

Value

MRtest returns the print of a list of results. First, the summary of y. Second, the statistics of the test
chosen. And finally, the mean group results for each test. If MRtest function is stored in an object,
the results will be printed and also stored in the object.

Examples

# Simulated data (completely randomized design)

# Response variable
rv <- c(100.08, 105.66, 97.64, 100.11, 102.60, 121.29, 100.80,
   99.11, 104.43, 122.18, 119.49, 124.37, 123.19, 134.16,
   125.67, 128.88, 148.07, 134.27, 151.53, 127.31)

# Treatments
treat <- factor(rep(LETTERS[1:5], each = 4))

# Anova
res <- aov(rv~treat)
Dferro <- res$Df[2]
MSe <- res$Mean Sq[2]
```
# Loading the midrangeMCP package
library(midrangeMCP)

# applying the tests
results <- MRtest(y = rv,
                trt = treat,
                dferror = DError,
                merror = MError,
                alpha = 0.05,
                main = "Multiple Comparison Procedure: MGM test",
                MCP = c("MGM"))

# Other option for the MCP argument is "all". All tests are used.
results$Groups    # Results of the tests
results$Statistics # Main arguments of the tests
results$Summary   # Summary of the response variable

# Using the y argument as aov or lm model
res <- aov(rv~treat)
MRtest(y = res, trt = "treat", alpha = 0.05,
       main = "Multiple Comparison Procedure: MGM test",
       MCP = c("MGM"))

# For unbalanced data: It will be used the harmonic mean of
# the number of experiment replicates

# Using the previous example
rv <- rv[-1]
treat <- treat[-1]
res <- lm(rv~treat) # Linear model

# Multiple comparison procedure: MGR test
MRtest(y = res, trt = "treat", alpha = 0.05,
       main = "Multiple Comparison Procedure: MGR test",
       MCP = c("MGR"))

# Assuming that the available data are the averages
# of the treatments and the analysis of variance

# Analysis of Variance Table

# Response: rv
# Df Sum Sq Mean Sq F value    Pr(>F)
# treat  4 4135.2 1033.80 14.669 4.562e-05 ***
# Residuals 15 1057.1  70.47

mean.treat <- c(100.87, 105.95, 117.62, 127.97, 140.30)
treat <- factor(LETTERS[1:5])
DError <- 15
```
MRwrite

MSerror <- 70.47488
replic <- 4

MRtest(y = mean.treat,
trt = treat,
dferror = DFerror,
mserror = MSerror,
replication = replic,
alpha = 0.05,
main = "Multiple Comparison Procedure: MGM test",
MCP = c("MGM"),
ismeans = TRUE)

MRwrite

Export the results of the MRtest function.

Description

The x object from a MRtest is written to file arguments.

Usage

MRwrite(x, MCP = "all", extension = "csv", dataMR = "all")

Arguments

x object from the MRtest functions.

MCP Allows choosing the multiple comparison test. The default is "all". This option will go perform all tests from the MRtest object.

extension Type of format of the file. Four options "csv", "txt" "xlsx" and "latex". The default is "csv".

dataMR Allows to choose the results to bee written. Three options are available: "groups", "summary" or "all". The option "groups" writes the treatment mean groups evaluated by the chosen test in the MCP argument. The "summary" writes the descriptive statistics of the response variable. The options "all" should be chosen for both results.

Details

Note that the choice of the tests in the MRwrite function must be in accordance with the tests chosen in the x argument.

Value

MRwrite writes the most important results for the chosen tests in the MCP argument.
Examples

# Simulated data (completely randomized design)
rv <- c(100.08, 105.66, 97.64, 100.11, 102.60, 121.29, 100.80, 99.11, 104.43, 122.18, 119.49, 124.37, 123.19, 134.16, 125.67, 128.88, 148.07, 134.27, 151.53, 127.31)

# Treatments
treat <- factor(rep(LETTERS[1:5], each = 4))

# Anova
res <- aov(rv~treat)

# Loading the midrangeMCP package
library(midrangeMCP)

# Choosing any tests
results <- MRtest(y = res, trt = "treat", alpha = 0.05, 
main = "Multiple Comparison Procedures", 
MCP = c("MGM", "TM"))

#Export file in latex (Output in Console)
MRwrite(results, MCP = "all", extension = "latex", dataMR = "all")

#Observation: The MRwrite function export
# only one extension at a time
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