SiegelTukeyTest {DescTools} R Documentation

# Siegel-Tukey Test For Equality In Variability

## Description

Non-parametric Siegel-Tukey test for equality in variability. The null hypothesis is that the variability of x is equal between two groups. A rejection of the null hypothesis indicates that variability differs between the two groups. `SiegelTukeyRank` returns the ranks, calculated after Siegel Tukey logic.

## Usage

```
SiegelTukeyTest(x, ...)

## Default S3 method:
SiegelTukeyTest(x, y, adjust.median = FALSE,
                alternative = c("two.sided", "less", "greater"),
                mu = 0, exact = NULL, correct = TRUE, conf.int = FALSE,
                conf.level = 0.95, ...)

## S3 method for class 'formula'
SiegelTukeyTest(formula, data, subset, na.action, ...)


SiegelTukeyRank(x, g, drop.median = TRUE)
```

## Arguments

| | |
|---|---|
| x, y | numeric vector of data values. Non-finite (e.g. infinite or missing) values will be omitted. |
| g | a vector or factor object giving the group for the corresponding elements of x. |
| adjust.median | Should between-group differences in medians be leveled before performing the test? In certain cases, the Siegel-Tukey test is susceptible to median differences and may indicate significant differences in variability that, in reality, stem from differences in medians. Default is `FALSE`. |
| alternative | a character string specifying the alternative hypothesis, must be one of `"two.sided"` (default), `"greater"` or `"less"`. You can specify just the initial letter. |
| mu | a number specifying an optional parameter used to form the null hypothesis. See Details. |
| exact | a logical indicating whether an exact p-value should be computed. This is passed directly to `wilcox.test`. |

`correct`
: a logical indicating whether to apply continuity correction in the normal approximation for the p-value.

`conf.int`
: a logical indicating whether a confidence interval should be computed.

`conf.level`
: confidence level of the interval.

`formula`
: a formula of the form `lhs ~ rhs` where `lhs` gives the data values and rhs the corresponding groups.

`data`
: an optional matrix or data frame (or similar: see `model.frame`) containing the variables in the formula `formula`. By default the variables are taken from `environment(formula)`.

`subset`
: an optional vector specifying a subset of observations to be used.

`na.action`
: a function which indicates what should happen when the data contain NAs. Defaults to `getOption("na.action")`.

`drop.median`
: logical, defining whether the median of the combined samples should be left out, ensuring that there's an even number of elements (which is a requirement of the Siegel-Tukey test). Defaults to `TRUE`.

`...`
: further arguments to be passed to or from methods.

## Details

The Siegel-Tukey test has relatively low power and may, under certain conditions, indicate significance due to differences in medians rather than differences in variabilities (consider using the argument `adjust.median`). Consider also using `mood.test` or `ansari.test`.

## Value

A list of class `htest`, containing the following components:

`statistic`
: Siegel-Tukey test (Wilcoxon test on tie-adjusted Siegel-Tukey ranks, after the median adjustment if specified).

`p.value`
: the p-value for the test

`null.value`
: is the value of the median specified by the null hypothesis. This equals the input argument `mu`.

`alternative`
: a character string describing the alternative hypothesis.

`method`
: the type of test applied

`data.name`
: a character string giving the names of the data.

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## References

Siegel, S., Tukey, J. W. (1960): A nonparametric sum of ranks procedure for relative spread in unpaired samples. *Journal of the American Statistical Association*.

Sheskin, D. J. (2004): *Handbook of parametric and nonparametric statistical procedures* 3rd edition. Chapman and Hall/CRC. Boca Raton, FL.

## See Also

`mood.test`, `ansari.test`, `wilcox.test`, `LeveneTest`

## Examples

```
# Duller, S. 183
x <- c(12, 13, 29, 30)
y <- c(15, 17, 18, 24, 25, 26)
SiegelTukeyTest(x, y)
SiegelTukeyTest(x, y, alternative="greater")

# Duller, S. 323
old <- c(870,930,935,1045,1050,1052,1055)
new <- c(932,970,980,1001,1009,1030,1032,1040,1046)
SiegelTukeyTest(old, new, alternative = "greater")
# compare to the recommended alternatives
mood.test(old, new, alternative="greater")
ansari.test(old, new, alternative="greater")

# Bortz, S. 250
x <- c(26.3,26.5,26.8,27.0,27.0,27.2,27.3,27.3,27.4,27.5,27.6,27.8,27.9)
id <- c(2,2,2,1,2,2,1,2,2,1,1,1,2)-1
SiegelTukeyTest(x ~ id)


# Sachs, Angewandte Statistik, 12. Auflage, 2007, S. 314
A <- c(10.1,7.3,12.6,2.4,6.1,8.5,8.8,9.4,10.1,9.8)
```

```
B <- c(15.3,3.6,16.5,2.9,3.3,4.2,4.9,7.3,11.7,13.1)
SiegelTukeyTest(A, B)



### 1
x <- c(4,4,5,5,6,6)
y <- c(0,0,1,9,10,10)
SiegelTukeyTest(x, y)

### 2
# example for a non equal number of cases:
x <- c(4,4,5,5,6,6)
y <- c(0,0,1,9,10)
SiegelTukeyTest(x, y)

### 3
x <- c(33, 62, 84, 85, 88, 93, 97, 4, 16, 48, 51, 66, 98)
id <- c(0,0,0,0,0,0,0,1,1,1,1,1,1)
SiegelTukeyTest(x ~ id)

### 4
x <- c(177,200,227,230,232,268,272,297,47,105,126,142,158,172,197,220,225,230,262,270)
id <- c(rep(0,8),rep(1,12))
SiegelTukeyTest(x ~ id, adjust.median=TRUE)

### 5
x <- c(33,62,84,85,88,93,97)
y <- c(4,16,48,51,66,98)
SiegelTukeyTest(x, y)

### 6
x <- c(0,0,1,4,4,5,5,6,6,9,10,10)
id <- c(0,0,0,1,1,1,1,1,1,0,0,0)
SiegelTukeyTest(x ~ id)

### 7
x <- c(85,106,96, 105, 104, 108, 86)
id <- c(0,0,1,1,1,1,1)
SiegelTukeyTest(x ~ id)
```

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