Package 'RSStest'

February 24, 2023

Title Testing the Equality of Two Means Using RSS and MRSS

Version 1.0

Description Testing the equality of two means using Ranked Set Sampling
and Median Ranked Set Sampling are provided under normal distribution. Data generation functions are also given RSS and MRSS.
Also, data generation functions are given under imperfect ranking data for Ranked Set Sampling and Median Ranked Set Sampling.
Ozdemir Y.A., Ebegil M., & Gokpinar F. (2019), <doi:10.1007/s40995-018-0558-0>
Ozdemir Y.A., Ebegil M., & Gokpinar F. (2017), <doi:10.1080/03610918.2016.1263736>.

License GPL-2

Depends R (>= 3.5.0), huxtable (>= 5.4.0)

Imports stats, graphics

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LazyData True

RoxygenNote 7.2.3

NeedsCompilation no

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R topics documented:

CVT *CVT Data*

Description

CVT Data

Usage

```
data(CVT)
```

Format

A dataframe with 167 rows 6 variables

r1 otolith length

otolith.width otolith width

otolith.weight otolith weight

fish.length fish lenght

fish.weight fish weight

age age

sex sex

Examples

```
data("CVT")
```

---

datagen_MRSS *Median Ranked Set Sampling Data Generation*

Description

This function generates random samples from normal population using Median ranked set sampling with mean μ and standard deviation σ using cycle size r and set size m.

Usage

```
datagen_MRSS(mu, s, m, r)
```

Arguments

mu	: Normal population mean μ
s	: Normal population standard deviation σ
m	: Set size
r	: Cycle size

Value

A sample matrix with size rxm generated from normal distribution using Median ranked set sampling. Each row indicates a cycle.

References

MacEachern, S. N., Öztürk, Ö., Wolfe, A. D. (2002). A new ranked set sample estimator of variance. Journal of the Royal Statistical Society: Series B., 64, Part 2 177–188.

Özturk, Ö., Balakrishnan N (2009) Exact two-sample nonparametric test for quantile difference between two populations based on ranked set samples. Ann Inst Stat Math 61(1):235–249

Özdemir, Y. A., Ebegil, M., & Gökpinar, F. (2017). A test statistic based on ranked set sampling for two normal means. Communications in Statistics-Simulation and Computation, 46(10), 8077-8085.

Özdemir, Y. A., Ebegil, M., & Gökpinar, F. (2019). A test statistic for two normal means with median ranked set sampling. Iranian Journal of Science and Technology, Transactions A: Science, 43(3), 1109-1126.

See Also

datagen_RSS, teststat_RSS teststat_MRSS

Examples

```
datagen_MRSS(0,1,2,3)
```

---

datagen_RSS *Ranked Set Sampling Data Generation*

Description

This function generates random samples from normal population using ranked set sampling with mean μ and standard deviation σ using cycle size r and set size m.

Usage

```
datagen_RSS(mu, s, m, r)
```

Arguments

mu	: Normal population mean μ
s	: Normal population standard deviation σ
m	: Set size
r	: Cycle size

Value

A sample matrix with size rxm generated from normal distribution using ranked set sampling. Each row indicates a cycle.

References

MacEachern, S. N., Öztürk, Ö., Wolfe, A. D. (2002). A new ranked set sample estimator of variance. Journal of the Royal Statistical Society: Series B., 64, Part 2 177–188.

Özturk, Ö., Balakrishnan N (2009) Exact two-sample nonparametric test for quantile difference between two populations based on ranked set samples. Ann Inst Stat Math 61(1):235–249

Özdemir, Y. A., Ebegil, M., & Gökpinar, F. (2017). A test statistic based on ranked set sampling for two normal means. Communications in Statistics-Simulation and Computation, 46(10), 8077-8085.

Özdemir, Y. A., Ebegil, M., & Gökpinar, F. (2019). A test statistic for two normal means with median ranked set sampling. Iranian Journal of Science and Technology, Transactions A: Science, 43(3), 1109-1126.

See Also

datagen_MRSS, teststat_RSS teststat_MRSS

Examples

```
datagen_RSS(0,1,2,3)
```

---

imperfectMRSS *Imperfect Median Ranked Set Sampling Data Generation from Finite Population*

Description

This function chooses Median Ranked Set samples from specific finite population using auxiliary variable with cycle sizes r1 and r2 and set sizes m1 and m2.

Usage

```
imperfectMRSS(df, cat, catname, aux, var, r1, r2, m1, m2)
```

Arguments

df	: dataframe of the finite population
cat	: the indicator variable that shows the group of units
catname	: the group names
aux	: auxilary variable
var	: variable of interest
r1	: Cycle size of first group
r2	: Cycle size of second group
m1	: Set size of first group
m2	: Set size of second group

Value

two median ranked set sample matrix with sizes r1xm1 and r2xm2 from finite population. Each row indicates a cycle.

References

MacEachern, S. N., Öztürk, Ö., Wolfe, A. D. (2002). A new ranked set sample estimator of variance. Journal of the Royal Statistical Society: Series B., 64, Part 2 177–188.

Özturk, Ö., Balakrishnan N (2009) Exact two-sample nonparametric test for quantile difference between two populations based on ranked set samples. Ann Inst Stat Math 61(1):235–249

Özdemir, Y. A., Ebegil, M., & Gökpinar, F. (2017). A test statistic based on ranked set sampling for two normal means. Communications in Statistics-Simulation and Computation, 46(10), 8077-8085.

Özdemir, Y. A., Ebegil, M., & Gökpinar, F. (2019). A test statistic for two normal means with median ranked set sampling. Iranian Journal of Science and Technology, Transactions A: Science, 43(3), 1109-1126.

See Also

datagen_RSS, teststat_RSS teststat_MRSS,imperfectRSS

Examples

```
data(otolith)
imperfectMRSS(otolith,"sex",c("F","M"),"fish.length","age",3,3,4,3)
```

`imperfectRSS` *Imperfect Ranked Set Sampling Data Generation from Finite Population*

Description

This function chooses Ranked Set samples from specific finite population using auxiliary variable with cycle sizes r1 and r2 and set sizes m1 and m2.

Usage

```
imperfectRSS(df, cat, catname, aux, var, r1, r2, m1, m2)
```

Arguments

`df`	: dataframe of the finite population
`cat`	: the indicator variable that shows the group of units
`catname`	: the group names
`aux`	: auxilary variable
`var`	: variable of interest
`r1`	: Cycle size of first group
`r2`	: Cycle size of second group
`m1`	: Set size of first group
`m2`	: Set size of second group

Value

two ranked set sample matrix with sizes r1xm1 and r2xm2 from finite population. Each row indicates a cycle.

References

MacEachern, S. N., Öztürk, Ö., Wolfe, A. D. (2002). A new ranked set sample estimator of variance. Journal of the Royal Statistical Society: Series B., 64, Part 2 177–188.

Özturk, Ö., Balakrishnan N (2009) Exact two-sample nonparametric test for quantile difference between two populations based on ranked set samples. Ann Inst Stat Math 61(1):235–249

Özdemir, Y. A., Ebegil, M., & Gökpinar, F. (2017). A test statistic based on ranked set sampling for two normal means. Communications in Statistics-Simulation and Computation, 46(10), 8077-8085.

Özdemir, Y. A., Ebegil, M., & Gökpinar, F. (2019). A test statistic for two normal means with median ranked set sampling. Iranian Journal of Science and Technology, Transactions A: Science, 43(3), 1109-1126.

See Also

`datagen_RSS`, `teststat_RSS` `teststat_MRSS`, `imperfectMRSS`

Examples

```
data(otolith)
imperfectRSS(otolith,"sex",c("F","M"),"fish.length","age",3,3,4,3)
```

`otolith` *Otolith Data*

Description

The data related to otolith bone of fishes was collected from Elazığ Keban Dam Lake (November 2011-December 2012), which was a part of the data by given Doğan and Şen(2017). The data containing otolith length, otolith width, otolith weight, fish length, fish width, age and sex.

Usage

```
data(otolith)
```

Format

A dataframe with 167 rows 6 variables

otolith.length otolith length

otolith.width otolith width

otolith.weight otolith weight

fish.length fish lenght

fish.weight fish weight

age age

sex sex

Source

Doğan Y. Şen D., Otolith Biometry-Fish Lenth Relationship in Capoeta trutta Inhabiting Keban Dam Lake

Examples

```
data("otolith")
```

`teststat_MRSS` *Median Ranked Set Sampling Test*

Description

This function tests for the difference of two population means using ranked set sampling given in Özdemir, Ebegil and Gökpınar (2019).

Usage

```
teststat_MRSS(
  x1,
  x2,
  alpha = 0.05,
  alternative = "two-tailed",
  tn = 2000,
  table = TRUE
)
```

Arguments

`x1`	A (non-empty) numeric matrix (m1xr1) of median ranked set sample for Group 1 with set size m1 and cycle size r1.
`x2`	A (non-empty) numeric matrix (m2xr2) of median ranked set sample for Group 2 with set size m2 and cycle size r2.
`alpha`	A scalar value of the significance level for hypothesis testing used in the table. Default is 0.05.
`alternative`	A character string specifying the alternative hypothesis, must be one of "two-sided", "right" or "left". Can be abbreviated. Default is "two-sided".
`tn`	A scalar value of the number of repetitions of Monte Carlo simulation. Default is 2000.
`table`	A logical value that shows table gives the results of the hypothesis test are printed out. Default is TRUE.

Value

If table is TRUE the hypothesis test results table includes sample sizes, test statistics, p values and test results are printed out.

References

MacEachern, S. N., Öztürk, Ö., Wolfe, A. D. (2002). A new ranked set sample estimator of variance. Journal of the Royal Statistical Society: Series B., 64, Part 2 177–188.

Özturk, Ö., Balakrishnan N (2009) Exact two-sample nonparametric test for quantile difference between two populations based on ranked set samples. Ann Inst Stat Math 61(1):235–249

Özdemir, Y. A., Ebegil, M., & Gökpinar, F. (2017). A test statistic based on ranked set sampling for two normal means. Communications in Statistics-Simulation and Computation, 46(10), 8077-8085.

Özdemir, Y. A., Ebegil, M., & Gökpinar, F. (2019). A test statistic for two normal means with median ranked set sampling. Iranian Journal of Science and Technology, Transactions A: Science, 43(3), 1109-1126.

See Also

datagen_MRSS, datagen_RSS, teststat_RSS

Examples

```
x1=matrix(c(1,2.3, 3.4,4.5,5.6,4 ),nrow=3)
x2=matrix(c(2,3.2, 4.2,6.5,4.6,6 ),nrow=3)
teststat_MRSS(x1,x2,tn=1000)
```

---

teststat_RSS *Ranked Set Sampling Test*

Description

This function tests for the difference of two population means using ranked set sampling given in Özdemir, Ebegil and Gökpınar (2017).

Usage

```
teststat_RSS(x1, x2, alpha = 0.05, alternative = "two-tailed", table = TRUE)
```

Arguments

x1	A (non-empty) numeric matrix (m1xr1) of ranked set sample for Group 1 with set size m1 and cycle size r1.
x2	A (non-empty) numeric matrix (m2xr2) of ranked set sample for Group 2 with set size m2 and cycle size r2.
alpha	A scalar value of the significance level for hypothesis testing used in the table. Default is 0.05.
alternative	A character string specifying the alternative hypothesis, must be one of "two-sided", "right" or "left". Can be abbreviated. Default is "two-sided".
table	A logical value that shows table gives the results of the hypothesis test are printed out. Default is TRUE.

Value

If table is TRUE the hypothesis test results table includes sample sizes, test statistics, critical values and test results are printed out.

References

MacEachern, S. N., Öztürk, Ö., Wolfe, A. D. (2002). A new ranked set sample estimator of variance. Journal of the Royal Statistical Society: Series B., 64, Part 2 177–188.

Özturk, Ö., Balakrishnan N (2009) Exact two-sample nonparametric test for quantile difference between two populations based on ranked set samples. Ann Inst Stat Math 61(1):235–249

Özdemir, Y. A., Ebegil, M., & Gökpinar, F. (2017). A test statistic based on ranked set sampling for two normal means. Communications in Statistics-Simulation and Computation, 46(10), 8077-8085.

Özdemir, Y. A., Ebegil, M., & Gökpinar, F. (2019). A test statistic for two normal means with median ranked set sampling. Iranian Journal of Science and Technology, Transactions A: Science, 43(3), 1109-1126.

@seealso `datagen_MRSS`, `datagen_RSS`, `teststat_MRSS`

Examples

```
x1=matrix(c(1,2.3, 3.4,4.5,5.6,4 ),nrow=3)
x2=matrix(c(2,3.2, 4.2,6.5,4.6,6 ),nrow=3)
teststat_RSS(x1,x2)
```

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