Package ‘pspearman’

May 9, 2026

Version 0.3-1

Date 2022-05-02

Title Spearman's Rank Correlation Test

Author Petr Savicky <savicky@cs.cas.cz>

Maintainer Petr Savicky <savicky@cs.cas.cz>

Description Spearman's rank correlation test with precomputed exact null distribution for n <= 22.

License GPL-3

NeedsCompilation yes

Repository CRAN

Date/Publication 2022-05-02 10:30:02 UTC

Contents

`pspearman` *Distribution function of Spearman’s rho*

Description

This function provides three types of approximations of the distribution function of Spearman’s rho. Besides the two approximations used in `cor.test(,method="spearman")`, which are AS89 and the t-distribution, this function allows to use precomputed null distribution for `n <= 22`. See `spearman.test` for the details of the algorithm used to compute this null distribution.

Usage

```
pspearman(s, n, lower.tail = TRUE,
    approximation = c("exact", "AS89", "t-distribution"))
```

Arguments

s	The observed value of S statistics sum((rank(x) - rank(y))^2).
n	The number of observations.
lower.tail	If TRUE (the default), the probability of S <= s is computed. If FALSE, the probability of S >= s is computed.
approximation	Selection of the method of approximation of the distribution function.

Details

See spearman.test for more detail.

Value

Depending on lower.tail, either the probability of S <= s or of S >= s is computed, where S is the statistics sum((rank(x) - rank(y))^2).

Examples

```
pspearman(36, 10, approximation="exact") # [1] 0.005265377
pspearman(36, 10, approximation="AS89")  # [1] 0.005825634
```

---

spearman.test *Spearman's rank correlation test with precomputed null distribution*

Description

This function is a modification of the part of the function cor.test(), which evaluates Spearman's rank correlation test. Besides the two approximations used in cor.test(,method="spearman"), which are AS89 and the t-distribution, this function allows to use precomputed null distribution for n <= 22.

Usage

```
spearman.test(x, y,
    alternative = c("two.sided", "less", "greater"),
    approximation = c("exact", "AS89", "t-distribution"))
```

Arguments

x, y, alternative	have the same meaning as in cor.test. See the corresponding help page.
approximation	selection of the method to approximate the null distribution

Details

Calculation of the exact null distribution of Spearman's rank correlation statistics is exponentially hard in n. This package uses precomputed exact distribution for n <= 22 obtained using Ryser's formula applied to an appropriate monomial permanent as described in *M.A. van de Wiel and A. Di Bucchianico, Fast computation of the exact null distribution of Spearman's rho and Page's L statistic for samples with and without ties, J. Stat. Plann. Inf. 92 (2001), pp. 133-145.* using code written by the author of the package. The resulting distributions are identical to those computed by an independent program kindly provided by M.A. van de Wiel.

Value

A list with class "htest" with the same structure as the value of the function cor.test(method="spearman"). Except of the p-value, also the contents is identical.

Examples

```
x <- 1:10
y <- c(5:1, 6, 10:7)
out1 <- spearman.test(x, y)
out2 <- spearman.test(x, y, approximation="AS89")
out3 <- cor.test(x, y, method="spearman")
out1$p.value # [1] 0.05443067  this is the exact value
out2$p.value # [1] 0.05444507  approximation obtained from AS89
out3$p.value # [1] 0.05444507  ditto
```

Index