

Package ‘pspearman’

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Title Spearman's Rank Correlation Test

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Description Spearman's rank correlation test with precomputed exact null distribution for $n \leq 22$.

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pspearman	<i>Distribution function of Spearman's rho</i>
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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 $n \leq 22$. 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

<code>s</code>	The observed value of S statistics $\text{sum}((\text{rank}(x) - \text{rank}(y))^2)$.
<code>n</code>	The number of observations.
<code>lower.tail</code>	If TRUE (the default), the probability of $S \leq s$ is computed. If FALSE, the probability of $S \geq s$ is computed.
<code>approximation</code>	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 $S \leq s$ or of $S \geq s$ is computed, where S is the statistics $\text{sum}((\text{rank}(x) - \text{rank}(y))^2)$.

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 $n \leq 22$.

Usage

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

Arguments

<code>x, y, alternative</code>	have the same meaning as in <code>cor.test</code> . See the corresponding help page.
<code>approximation</code>	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 $n \leq 22$ 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
```

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