

# Package ‘cocotest’

May 8, 2026

**Type** Package

**Title** Dependence Condition Test Using Ranked Correlation Coefficients

**Version** 1.0.3

**Date** 2023-12-22

**Description** A common misconception is that the Hochberg procedure comes up with adequate overall type I error control when test statistics are positively correlated. However, unless the test statistics follow some standard distributions, the Hochberg procedure requires a more stringent positive dependence assumption, beyond mere positive correlation, to ensure valid overall type I error control. To fill this gap, we formulate statistical tests grounded in rank correlation coefficients to validate fulfillment of the positive dependence through stochastic ordering (PDS) condition.  
See Gou, J., Wu, K. and Chen, O. Y. (2024). Rank correlation coefficient based tests on positive dependence through stochastic ordering with application in cancer studies, Technical Report.

**License** GPL-3

**Encoding** UTF-8

**Depends** R ( $\geq$  4.2.0)

**Imports** boot ( $\geq$  1.1), stats ( $\geq$  4.0.0)

**RoxygenNote** 7.2.3

**NeedsCompilation** no

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**Repository** CRAN

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coco1	<i>Type 1 Rank correlation coefficient based test on positive dependence through stochastic ordering</i>
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### Description

This function evaluates the assumption of positive dependence through stochastic ordering in multiple comparison procedures

### Usage

```
coco1(cordx, cordy, alpha = 0.05, Rboot = 100, seed = 1)
```

### Arguments

cordx	a numeric vector
cordy	a numeric vector
alpha	a number of significance level
Rboot	a number of bootstrap replicates
seed	a number of the seed of random number generator

### Details

R package boot is included for computing nonparametric bootstrap confidence intervals

### Value

a vector of three numbers: a lower bound of one-sided confidence interval lower\_bound, a test statistic estimation, and an indicator whether the PDS condition holds or not PDS\_assumption

### Author(s)

Jiangtao Gou  
Fengqing Zhang

### References

Gou, J., Wu, K. and Chen, O. Y. (2024). Rank correlation coefficient based tests on positive dependence through stochastic ordering with application in cancer studies, Technical Report. Gou, J. (2023). On dependence assumption in p-value based multiple test procedures. *Journal of Biopharmaceutical Statistics*, 33(5), 596-610. Gou, J. (2024). A test of the dependence assumptions for the Simes-test-based multiple test procedures. *Statistics in Biopharmaceutical Research*, 16(1), 1-7.

**Examples**

```
set.seed(123)
cordx <- rnorm(40)
cordy <- rnorm(40)
coco1(cordx, cordy)
```

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coco2	<i>Type 2 Rank correlation coefficient based test on positive dependence through stochastic ordering</i>
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**Description**

This function evaluates the assumption of positive dependence through stochastic ordering in multiple comparison procedures

**Usage**

```
coco2(cordx, cordy, alpha = 0.05, Rboot = 100, seed = 1)
```

**Arguments**

cordx	a numeric vector
cordy	a numeric vector
alpha	a number of significance level
Rboot	a number of bootstrap replicates
seed	a number of the seed of random number generator

**Details**

R package boot is included for computing nonparametric bootstrap confidence intervals

**Value**

a vector of three numbers: a lower bound of one-sided confidence interval `lower_bound`, a test statistic estimation, and an indicator whether the PDS condition holds or not `PDS_assumption`

**Author(s)**

Jiangtao Gou  
Fengqing Zhang

## References

Gou, J., Wu, K. and Chen, O. Y. (2024). Rank correlation coefficient based tests on positive dependence through stochastic ordering with application in cancer studies, Technical Report. Gou, J. (2023). On dependence assumption in p-value based multiple test procedures. *Journal of Biopharmaceutical Statistics*, 33(5), 596-610. Gou, J. (2024). A test of the dependence assumptions for the Simes-test-based multiple test procedures. *Statistics in Biopharmaceutical Research*, 16(1), 1-7.

## Examples

```
set.seed(123)
cordx <- rnorm(40)
cordy <- rnorm(40)
coco2(cordx, cordy)
```

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