Package 'RProbSup'

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Type Package

Title Calculates Probability of Superiority

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Description The A() function calculates the A statistic, a nonparametric measure of effect size for two independent groups that's also known as the probability of superiority (Ruscio, 2008), along with its standard error and a confidence interval constructed using bootstrap methods (Ruscio & Mullen, 2012). Optional arguments can be specified to calculate variants of the A statistic developed for other research designs (e.g., related samples, more than two independent groups or related samples; Ruscio & Gera, 2013).
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A *A*

Description

Calculates probability of superiority (A), its standard error, and a confidence interval.

Usage

```
A(data, design = 1, statistic = 1, weights = FALSE,
w = 0, w1 = 0, w2 = 0, increase = FALSE, ref = 1, r = 0,
n.bootstrap = 1999, conf.level = .95, ci.method = 1, seed = 1)
```

Arguments

data	For a between subjects design, a matrix of cases (rows) by scores (column 1) and group codes (column 2). For a within subjects design, a matrix of scores with each sample in its own column (matrix).
design	Design of experiment (scalar, default = 1 (for between subjects design), user can also call 2 (for within subjects design)).
statistic	Statistic to be calculated (scalar, default = 1 (A), user can also call 2 (A.AAD), 3 (A.AAPD), 4 (A.IK), or 5 (A.Ord)).
weights	Whether to assign weights to cases (default = FALSE); if set to TRUE, data contains case weights in final column.
w	Weights for cases (vector; default = 0).
w1	Weights for cases in group 1 (vector; default = 0).
w2	Weights for cases in group 2 (vector; default = 0).
increase	Set to TRUE if scores are predicted to increase with group codes (default = FALSE).

ref	Reference group (to compare to all others) (scalar, default = 1).
r	Vector of proportions (vector, default = 0, represents equal proportions).
n.bootstrap	Number of bootstrap samples (scalar, default = 1999).
conf.level	Confidence level (default = .95).
ci.method	Method used to construct confidence interval (scalar, default = 1 (for BCA), user can also call 2 (for percentile)).
seed	Random number seed (scalar, default = 1).

Value

Nothing; displays the A statistic, its estimated standard error, and the confidence interval.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
data <- cbind(c(x1, x2, x3), c(rep(1, 25), rep(2, 25), rep(3, 25)))
A(data, 1, 2)
```

A1 *A1*

Description

Calculates the standard error and constructs a confidence interval for the A statistic using bootstrap methods.

Usage

```
A1(y1, y2, weights = FALSE, w1 = 0, w2 = 0, n.bootstrap = 1999,
conf.level = .95, ci.method = 1, seed = 1)
```

Arguments

y1	Scores for group 1 (vector).
y2	Scores for group 2 (vector).
weights	Whether to weight cases (default = FALSE).
w1	Weights for cases in group 1 (optional) (vector, default is 0).
w2	Weights for cases in group 2 (optional) (vector, default is 0).
n.bootstrap	Number of bootstrap samples (scalar, default = 1999).
conf.level	Confidence level (scalar, default = .95).
ci.method	Method used to construct confidence interval (scalar, default = 1 (for BCA), user can also call 2 (for percentile).
seed	Random number seed (scalar, default = 1).

Value

A vector containing the A statistic, its estimated standard error, and the upper and lower bounds of the confidence interval.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
#Example used in Ruscio and Mullen (2012)
y1 <- c(6, 7, 8, 7, 9, 6, 5, 4, 7, 8, 7, 6, 9, 5, 4)
y2 <- c(4, 3, 5, 3, 6, 2, 2, 1, 6, 7, 4, 3, 2, 4, 3)
A1(y1, y2)
```

A2 *A2*

Description

Calculates the standard error and constructs a confidence interval for the A statistic for two correlated samples using bootstrap methods.

Usage

```
A2(y1, y2, weights = FALSE, w = 0, n.bootstrap = 1999,
conf.level = .95, ci.method = 1, seed = 1)
```

Arguments

y1	Scores for group 1 (vector).
y2	Scores for group 2 (vector).
weights	Whether to weight cases (default = FALSE).
w	Weights for cases in group 1 (optional) (vector, default is 0).
n.bootstrap	Number of bootstrap samples (scalar, default = 1999).
conf.level	Confidence level (scalar, default = .95).
ci.method	Method used to construct confidence interval (scalar, default = 1 (for BCA), user can also call 2 (for percentile).
seed	Random number seed (scalar, default = 1).

Value

A vector containing the A statistic, its estimated standard error, and the upper and lower bounds of the confidence interval.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
y1 <- c(6, 7, 8, 7, 9, 6, 5, 4, 7, 8, 7, 6, 9, 5, 4)
y2 <- c(7, 5, 6, 7, 6, 4, 3, 5, 4, 5, 4, 5, 7, 4, 5)
A2(y1, y2)
```

AAD1 *AAD1*

Description

Calculates the confidence interval for the A statistic for the average absolute deviation for two or more groups.

Usage

```
AAD1(y, r = 0, weights = FALSE, n.bootstrap = 1999, conf.level = .95,
ci.method = 1, seed = 1)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
r	Vector of proportions (default = 0, represents equal proportions) (vector).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).
n.bootstrap	Number of bootstrap samples (scalar, default = 1999).
conf.level	Confidence level (scalar, default = .95).
ci.method	Method used to construct confidence interval (scalar, default = 1 (for BCA), user can also call 2 (for percentile).
seed	Random number seed (scalar, default = 1).

Value

A vector containing the A statistic, its estimated standard error, and the upper and lower bounds of the confidence interval.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(c(x1, x2, x3), c(rep(1, 25), rep(2, 25), rep(3, 25)))
AAD1(y)
```

AAD2 *AAD2*

Description

Calculates the confidence interval for the A statistic for the average absolute deviation for two or more correlated samples.

Usage

```
AAD2(y, r = 0, weights = FALSE, n.bootstrap = 1999,
conf.level = .95, ci.method = 1, seed = 1)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
r	Vector of proportions (default = 0, represents equal proportions) (vector).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).
n.bootstrap	Number of bootstrap samples (scalar, default = 1999).
conf.level	Confidence level (scalar, default = .95).
ci.method	Method used to construct confidence interval (scalar, default = 1 (for BCA), user can also call 2 (for percentile).
seed	Random number seed (scalar, default = 1).

Value

A vector containing the A statistic, its estimated standard error, and the upper and lower bounds of the confidence interval.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(x1, x2, x3)
AAD2(y)
```

AAPD1 *AAPD1*

Description

Calculates the confidence interval for the A statistic for the average absolute paired deviation for two or more groups.

Usage

```
AAPD1(y, weights = FALSE, n.bootstrap = 1999,
conf.level = .95, ci.method = 1, seed = 1)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).
n.bootstrap	Number of bootstrap samples (scalar, default = 1999).
conf.level	Confidence level (scalar, default = .95).
ci.method	Method used to construct confidence interval (scalar, default = 1 (for BCA), user can also call 2 (for percentile).
seed	Random number seed (scalar, default = 1).

Value

A vector containing the A statistic, its estimated standard error, and the upper and lower bounds of the confidence interval.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(c(x1, x2, x3), c(rep(1, 25), rep(2, 25), rep(3, 25)))
AAPD1(y)
```

AAPD2 *AAPD2*

Description

Calculates the confidence interval for the A statistic for the average absolute paired deviation for two or more correlated samples.

Usage

```
AAPD2(y, weights = FALSE, n.bootstrap = 1999,
conf.level = .95, ci.method = 1, seed = 1)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).
n.bootstrap	Number of bootstrap samples (scalar, default = 1999).
conf.level	Confidence level (scalar, default = .95).
ci.method	Method used to construct confidence interval (scalar, default = 1 (for BCA), user can also call 2 (for percentile).
seed	Random number seed (scalar, default = 1).

Value

A vector containing the A statistic, its estimated standard error, and the upper and lower bounds of the confidence interval.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(x1, x2, x3)
AAPD2(y)
```

CalcA1 *CalcA1*

Description

Calculates the A statistic for 2 groups.

Usage

```
CalcA1(y1, y2, weights = FALSE, w1 = 0, w2 = 0)
```

Arguments

y1	Scores for group 1 (vector).
y2	Scores for group 2 (vector).
weights	Whether to weight cases (default = FALSE).
w1	Weights for cases in group 1 (optional) (vector, default is 0).
w2	Weights for cases in group 2 (optional) (vector, default is 0).

Value

a	The A statistic.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
#Example used in Ruscio and Mullen (2012)
y1 <- c(6, 7, 8, 7, 9, 6, 5, 4, 7, 8, 7, 6, 9, 5, 4)
y2 <- c(4, 3, 5, 3, 6, 2, 2, 1, 6, 7, 4, 3, 2, 4, 3)
CalcA1(y1, y2)
```

CalcA2 *CalcA2*

Description

Calculates the A statistic for 2 correlated samples.

Usage

```
CalcA2(y1, y2, weights = FALSE, w = 0)
```

Arguments

y1	Scores for variable 1 (vector).
y2	Scores for variable 2 (vector).
weights	Whether to weight cases (default = FALSE).
w	Weights (optional) (vector, default is 0).

Value

a	The A statistic.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
y1 <- c(6, 7, 8, 7, 9, 6, 5, 4, 7, 8, 7, 6, 9, 5, 4)
y2 <- c(7, 5, 6, 7, 6, 4, 3, 5, 4, 5, 4, 5, 7, 4, 5)
CalcA2(y1, y2)
```

CalcAAD1 *CalcAAD1*

Description

Calculates the A statistic for the average absolute deviation for two or more groups. Note: This function is not meant to be called by the user, but it is called by AAD1.

Usage

```
CalcAAD1(y, r = 0, weights = FALSE)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
r	Vector of proportions (default = 0, represents equal proportions) (vector).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).

Value

a	The A statistic.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(c(x1, x2, x3), c(rep(1, 25), rep(2, 25), rep(3, 25)))
CalcAAD1(y)
```

CalcAAD2 *CalcAAD2*

Description

Calculates the A statistic for the average absolute deviation for two or more correlated samples. Note: This function is not meant to be called by the user, but it is called by AAD2.

Usage

```
CalcAAD2(y, r = 0, weights = FALSE)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
r	Vector of proportions (default = 0, represents equal proportions) (vector).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).

Value

a	The A statistic.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(x1, x2, x3)
CalcAAD2(y)
```

CalcAAPD1 *CalcAAPD1*

Description

Calculates the A statistic for the average absolute paired deviation for two or more groups. Note: This function is not meant to be called by the user, but it is called by AAPD1.

Usage

```
CalcAAPD1(y, weights = FALSE)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).

Value

a	The A statistic.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(c(x1, x2, x3), c(rep(1, 25), rep(2, 25), rep(3, 25)))
AAPD1(y)
```

CalcAAPD2 *CalcAAPD2*

Description

Calculates the A statistic for the average absolute paired deviation for two or more correlated samples. Note: This function is not meant to be called by the user, but it is called by AAPD2.

Usage

```
CalcAAPD2(y, weights = FALSE)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).

Value

a	The A statistic.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(x1, x2, x3)
AAPD2(y)
```

CalcIK1 *CalcIK1*

Description

Calculates the A statistic while singling out one group for two or more groups. Note: This function is not meant to be called by the user, but it is called by IK1.

Usage

```
CalcIK1(y, ref = 1, weights = FALSE)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
ref	Reference group (to compare to all others) (scalar, default = 1).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).

Value

a	The A statistic.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(c(x1, x2, x3), c(rep(1, 25), rep(2, 25), rep(3, 25)))
CalcIK1(y)
```

CalcIK2 *CalcIK2*

Description

Calculates the A statistic while singling out one group for two or more correlated samples. Note: This function is not meant to be called by the user, but it is called by IK2.

Usage

```
CalcIK2(y, ref = 1, weights = FALSE)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
ref	Reference group (to compare to all others) (scalar, default = 1).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).

Value

a	The A statistic.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(x1, x2, x3)
CalcIK2(y)
```

CalcOrd1 *CalcOrd1*

Description

Calculates the ordinal comparison of the A statistic for two or more groups. Note: This function is not meant to be called by the user, but it is called by AOrd1.

Usage

```
CalcOrd1(y, weights = FALSE, increase = FALSE)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).
increase	Set to TRUE if scores are predicted to increase with group codes (default = FALSE).

Value

a	The A statistic.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(c(x1, x2, x3), c(rep(1, 25), rep(2, 25), rep(3, 25)))
CalcOrd1(y)
```

CalcOrd2 *CalcOrd2*

Description

Calculates the ordinal comparison of the A statistic for two or more correlated samples. Note: This function is not meant to be called by the user, but it is called by AOrd2.

Usage

```
CalcOrd2(y, weights = FALSE, increase = FALSE)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).
increase	Set to TRUE if scores are predicted to increase with group codes (default = FALSE).

Value

a	The A statistic.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(x1, x2, x3)
CalcOrd2(y)
```

IK1 *IK1*

Description

Calculates the confidence interval for the A statistic while singling out one group for two or more groups.

Usage

```
IK1(y, ref = 1, weights = FALSE, n.bootstrap = 1999,
conf.level = .95, ci.method = 1, seed = 1)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
ref	Reference group (to compare to all others) (scalar, default = 1).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).
n.bootstrap	Number of bootstrap samples (scalar, default = 1999).
conf.level	Confidence level (scalar, default = .95).
ci.method	Method used to construct confidence interval (scalar, default = 1 (for BCA), user can also call 2 (for percentile).
seed	Random number seed (scalar, default = 1).

Value

A vector containing the A statistic, its estimated standard error, and the upper and lower bounds of the confidence interval.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(c(x1, x2, x3), c(rep(1, 25), rep(2, 25), rep(3, 25)))
IK1(y)
```

IK2 *IK2*

Description

Calculates the confidence interval for the A statistic while singling out one group for two or more correlated samples.

Usage

```
IK2(y, ref = 1, weights = FALSE, n.bootstrap = 1999,
conf.level = .95, ci.method = 1, seed = 1)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
ref	Reference group (to compare to all others) (scalar, default = 1).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).
n.bootstrap	Number of bootstrap samples (scalar, default = 1999).
conf.level	Confidence level (scalar, default = .95).
ci.method	Method used to construct confidence interval (scalar, default = 1 (for BCA), user can also call 2 (for percentile).
seed	Random number seed (scalar, default = 1).

Value

A vector containing the A statistic, its estimated standard error, and the upper and lower bounds of the confidence interval.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(x1, x2, x3)
IK2(y)
```

Ord1 *Ord1*

Description

Calculates the confidence interval for the ordinal comparison of the A statistic for two or more groups.

Usage

```
Ord1(y, weights = FALSE, increase = FALSE, n.bootstrap = 1999,
conf.level = .95, ci.method = 1, seed = 1)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).
increase	Set to TRUE if scores are predicted to increase with group codes (default = FALSE).
n.bootstrap	Number of bootstrap samples (scalar, default = 1999).
conf.level	Confidence level (scalar, default = .95).
ci.method	Method used to construct confidence interval (scalar, default = 1 (for BCA), user can also call 2 (for percentile).
seed	Random number seed (scalar, default = 1).

Value

A vector containing the A statistic, its estimated standard error, and the upper and lower bounds of the confidence interval.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(c(x1, x2, x3), c(rep(1, 25), rep(2, 25), rep(3, 25)))
Ord1(y)
```

Ord2 *Ord2*

Description

Calculates the confidence interval for the ordinal comparison of the A statistic for two or more correlated samples.

Usage

```
Ord2(y, weights = FALSE, increase = FALSE, n.bootstrap = 1999,
conf.level = .95, ci.method = 1, seed = 1)
```

Arguments

y	Matrix of cases (rows) by scores (column 1) and group codes (column 2) (matrix).
weights	Weight of each case. Set to TRUE to weight cases; if so, column 3 contains case weights (default = FALSE).
increase	Set to TRUE if scores are predicted to increase with group codes (default = FALSE).
n.bootstrap	Number of bootstrap samples (scalar, default = 1999).
conf.level	Confidence level (scalar, default = .95).
ci.method	Method used to construct confidence interval (scalar, default = 1 (for BCA), user can also call 2 (for percentile).
seed	Random number seed (scalar, default = 1).

Value

A vector containing the A statistic, its estimated standard error, and the upper and lower bounds of the confidence interval.

Author(s)

John Ruscio

References

Ruscio (2008) & Ruscio and Mullen (2012) & Ruscio and Gera (2013)

Examples

```
x1 <- rnorm(25)
x2 <- x1 - rnorm(25, mean = 1)
x3 <- x2 - rnorm(25, mean = 1)
y <- cbind(x1, x2, x3)
Ord2(y)
```

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