

Package ‘corTest’

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Type Package

Title Robust Tests for Equal Correlation

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Description There are 6 novel robust tests for equal correlation. They are all based on logistic regressions. U are proportion to different types of correlation in 6 methods. The ST1() is based on Pearson correlation. ST2() improved ST1() by using median absolute deviation. ST3() utilized type M correlation and ST4() used Spearman correlation. ST5() and ST6() used two different ways to combine ST3() and ST4(). We highly recommend ST5() according to the passage New Statistical Methods for Constructing Robust Differential Correlation Networks to characterize the interactions among microRNAs published in Scientific Reports.

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fisher_transfer_test *Test for equal correlation*

Description

Compute p-value with Fisher's Z-transformation test. If biasCorrection is true, the corrected correlation is used. The formula is $\text{rho.corrected} = \text{rho} - \text{rho}/(2*(n-1))$.

Usage

```
fisher_transfer_test(x1,z1,x0,z0,biasCorrection=TRUE)
```

Arguments

x1	a numeric vector
z1	a numeric vector
x0	a numeric vector
z0	a numeric vector
biasCorrection	a boolean value

Value

p-value of test

Author(s)

Danyang Yu <danyangyu@hnu.edu.cn>, Weiliang Qiu <stwxq@channing.harvard.edu>

References

Danyang Yu, Zeyu Zhang, Kimberly Glass, Jessica Su, Dawn L. DeMeo, Kelan Tantisira, Scott T. Weiss, Weiliang Qiu (corresponding author). New Statistical Methods for Constructing Robust Differential Correlation Networks to characterize the interactions among microRNAs. Scientific Reports 9, Article number: 3499 (2019)

Examples

```
x1=ghdist(n=100,g=0.2,h=0.2)
x0=ghdist(n=100,g=0.2,h=0.2)
z1=x1+ghdist(n=100,g=0.2,h=0.2)
z0=x0+ghdist(n=100,g=0.2,h=0.2)
p=fisher_transfer_test(x1,z1,x0,z0)
print(p)
```

ghdist	<i>generating variables from g-and-h distribution</i>
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Description

generating variables from g-and-h distribution

Usage

```
ghdist(n,g=0,h=0)
```

Arguments

n	the number of the variables you want to generate
g	the parameter g of g-and-h distribution
h	the parameter h of g-and-h distribution

Value

n variables generated from g-and-h distribution

Examples

```
x=ghdist(50,0.2,0.2)
print(x)
```

st1	<i>test for equal correlation</i>
-----	-----------------------------------

Description

Compute p-value for the equal correlation test with Pearson correlation based on a logistic regression model corresponding to two independent groups

Usage

```
st1(x1,z1,x0,z0)
```

Arguments

x1	a numeric vector
z1	a numeric vector
x0	a numeric vector
z0	a numeric vector

Value

p-value of test

Author(s)

Danyang Yu <danyangyu@hnu.edu.cn>, Weiliang Qiu <stwxq@channing.harvard.edu>

References

Danyang Yu, Zeyu Zhang, Kimberly Glass, Jessica Su, Dawn L. DeMeo, Kelan Tantisira, Scott T. Weiss, Weiliang Qiu (corresponding author). New Statistical Methods for Constructing Robust Differential Correlation Networks to characterize the interactions among microRNAs. Scientific Reports 9, Article number: 3499 (2019)

Examples

```
x1=ghdist(n=100,g=0.2,h=0.2)
x0=ghdist(n=100,g=0.2,h=0.2)
z1=x1+ghdist(n=100,g=0.2,h=0.2)
z0=x0+ghdist(n=100,g=0.2,h=0.2)
p=st1(x1,z1,x0,z0)
print(p)
```

st2

install

Description

Compute p-value for the equal correlation test with mad-replacing-Pearson correlation based on a logistic regression model corresponding to two independent groups

Usage

```
st2(x1,z1,x0,z0)
```

Arguments

x1	a numeric vector
z1	a numeric vector
x0	a numeric vector
z0	a numeric vector

Value

p-value of test

Author(s)

Danyang Yu <danyangyu@hnu.edu.cn>, Weiliang Qiu <stwxq@channing.harvard.edu>

References

Danyang Yu, Zeyu Zhang, Kimberly Glass, Jessica Su, Dawn L. DeMeo, Kelan Tantisira, Scott T. Weiss, Weiliang Qiu (corresponding author). New Statistical Methods for Constructing Robust Differential Correlation Networks to characterize the interactions among microRNAs. Scientific Reports 9, Article number: 3499 (2019)

Examples

```
x1=ghdist(n=100,g=0.2,h=0.2)
x0=ghdist(n=100,g=0.2,h=0.2)
z1=x1+ghdist(n=100,g=0.2,h=0.2)
z0=x0+ghdist(n=100,g=0.2,h=0.2)
p=st2(x1,z1,x0,z0)
print(p)
```

st3

install

Description

Compute p-value for the equal correlation test with percentage bend correlation based on a logistic regression model corresponding to two independent groups

Usage

```
st3(x1, z1, x0, z0)
```

Arguments

x1	a numeric vector
z1	a numeric vector
x0	a numeric vector
z0	a numeric vector

Value

p-value of test

Author(s)

Danyang Yu <danyangyu@hnu.edu.cn>, Weiliang Qiu <stwxq@channing.harvard.edu>

References

Danyang Yu, Zeyu Zhang, Kimberly Glass, Jessica Su, Dawn L. DeMeo, Kelan Tantisira, Scott T. Weiss, Weiliang Qiu (corresponding author). New Statistical Methods for Constructing Robust Differential Correlation Networks to characterize the interactions among microRNAs. Scientific Reports 9, Article number: 3499 (2019)

Examples

```
x1=ghdist(n=100,g=0.2,h=0.2)
x0=ghdist(n=100,g=0.2,h=0.2)
z1=x1+ghdist(n=100,g=0.2,h=0.2)
z0=x0+ghdist(n=100,g=0.2,h=0.2)
p=st3(x1,z1,x0,z0)
print(p)
```

st4

install

Description

Compute p-value for the equal correlation test with Spearman correlation based on a logistic regression model corresponding to two independent groups

Usage

```
st4(x1,z1,x0,z0)
```

Arguments

x1	a numeric vector
z1	a numeric vector
x0	a numeric vector
z0	a numeric vector

Value

p-value of test

Author(s)

Danyang Yu <danyangyu@hnu.edu.cn>, Weiliang Qiu <stwxq@channing.harvard.edu>

References

Danyang Yu, Zeyu Zhang, Kimberly Glass, Jessica Su, Dawn L. DeMeo, Kelan Tantisira, Scott T. Weiss, Weiliang Qiu (corresponding author). New Statistical Methods for Constructing Robust Differential Correlation Networks to characterize the interactions among microRNAs. Scientific Reports 9, Article number: 3499 (2019)

Examples

```
x1=ghdist(n=100,g=0.2,h=0.2)
x0=ghdist(n=100,g=0.2,h=0.2)
z1=x1+ghdist(n=100,g=0.2,h=0.2)
z0=x0+ghdist(n=100,g=0.2,h=0.2)
p=st4(x1,z1,x0,z0)
print(p)
```

st5

install

Description

Compute p-value for the equal correlation test with combination of Spearman correlation and percentage bend correlation based on a logistic regression model corresponding to two independent groups

Usage

```
st5(x1, z1, x0, z0)
```

Arguments

x1	a numeric vector
z1	a numeric vector
x0	a numeric vector
z0	a numeric vector

Value

p-value of test

Author(s)

Danyang Yu <danyangyu@hnu.edu.cn>, Weiliang Qiu <stwxq@channing.harvard.edu>

References

Danyang Yu, Zeyu Zhang, Kimberly Glass, Jessica Su, Dawn L. DeMeo, Kelan Tantisira, Scott T. Weiss, Weiliang Qiu (corresponding author). New Statistical Methods for Constructing Robust Differential Correlation Networks to characterize the interactions among microRNAs. Scientific Reports 9, Article number: 3499 (2019)

Examples

```
x1=ghdist(n=100,g=0.2,h=0.2)
x0=ghdist(n=100,g=0.2,h=0.2)
z1=x1+ghdist(n=100,g=0.2,h=0.2)
z0=x0+ghdist(n=100,g=0.2,h=0.2)
p=st5(x1,z1,x0,z0)
print(p)
```

st6

install

Description

Compute p-value for the equal correlation test with another way to combine Spearman correlation and percentage bend correlation based on a multiple logistic regression model corresponding to two independent groups

Usage

```
st6(x1, z1, x0, z0)
```

Arguments

x1	a numeric vector
z1	a numeric vector
x0	a numeric vector
z0	a numeric vector

Value

p-value of test

Author(s)

Danyang Yu <danyangyu@hnu.edu.cn>, Weiliang Qiu <stwxq@channing.harvard.edu>

References

Danyang Yu, Zeyu Zhang, Kimberly Glass, Jessica Su, Dawn L. DeMeo, Kelan Tantisira, Scott T. Weiss, Weiliang Qiu (corresponding author). New Statistical Methods for Constructing Robust Differential Correlation Networks to characterize the interactions among microRNAs. Scientific Reports 9, Article number: 3499 (2019)

Examples

```
x1=ghdist(n=100,g=0.2,h=0.2)
x0=ghdist(n=100,g=0.2,h=0.2)
z1=x1+ghdist(n=100,g=0.2,h=0.2)
z0=x0+ghdist(n=100,g=0.2,h=0.2)
p=st6(x1,z1,x0,z0)
print(p)
```

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