Package 'pdcor'

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Type Package

Title Fast and Light-Weight Partial Distance Correlation

Version 1.2

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Depends R (>= 4.0)

Imports dcov, Rfast, Rfast2, stats

Description

Fast and memory-less computation of the partial distance correlation for vectors and matrices. Permutation-based and asymptotic hypothesis testing for zero partial distance correlation are also performed. References include: Szekely G. J. and Rizzo M. L. (2014). ``Partial distance correlation with methods for dissimilarities". The Annals Statistics, 42(6): 2382--2412. <doi:10.1214/14-AOS1255>. Shen C., Panda S. and Vogelstein J. T. (2022). ``The Chi-Square Test of Distance Correlation". Journal of Computational and Graphical Statistics, 31(1): 254--262. <doi:10.1080/10618600.2021.1938585>. Szekely G. J. and Rizzo M. L. (2023). ``The Energy of Data and Distance Correlation". Chapman and Hall/CRC. <ISBN:9781482242744>. Kontemeniotis N., Vargiakakis R. and Tsagris M. (2025). On independence testing using the (partial) distance correlation. <doi:10.48550/arXiv.2506.15659>.

License GPL (>= 2)

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Contents

`pdcor-package` *Fast and Light-Weight Partial Distance Correlation*

Description

Fast and memory-less computation of the partial distance correlation for vectors and matrices. Permutation-based and asymptotic hypothesis testing for zero partial distance correlation are also performed.

Details

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Type:	Package
Version:	1.2
Date:	2025-07-03
License:	GPL-2

Maintainers

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Author(s)

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`Hypothesis testing for many partial distance correlations`
Hypothesis testing for many partial distance correlations

Description

Hypothesis testing for many partial distance correlations.

Usage

```
mpdcor.test(y, x, z, R = 500)
```

Arguments

y	A numerical vector.
x	A numerical matrix.
z	A numerical vector.
R	The number of permutations to implement. If R = 1, the the asymptotic p-value is returned only.

Details

Hypothesis testing between y and each column of x, conditional on z is performed.

Value

A matrix with three columns: the unbiased partial distance correlation, the permutation based p-value and the asymptotic p-value as proposed by Shen, Panda and Vogelstein (2022).

Author(s)

Michail Tsagris.

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>.

References

Szekely G. J. and Rizzo M. L. (2014). Partial Distance Correlation with Methods for Dissimilarities. The Annals of Statistics, 42(6): 2382–2412.

Shen C., Panda S. and Vogelstein J. T. (2022). The Chi-Square Test of Distance Correlation. Journal of Computational and Graphical Statistics, 31(1): 254–262.

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Tsagris M. and Papadakis M. (2025). Fast and light-weight energy statistics using the R package Rfast. https://arxiv.org/abs/2501.02849

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See Also

mpdcor, pdcor.test

Examples

```
y <- iris[, 1]
x <- matrix( rnorm(150 * 10), ncol = 10 )
z <- iris[, 2]
mpdcor.test(y, x, z)
```

`Hypothesis testing for the partial distance correlation`
Hypothesis testing for the partial distance correlation

Description

Hypothesis testing for the partial distance correlation.

Usage

```
pdcor.test(x, y, z, type = 1, R = 500)
```

Arguments

`x`	A numerical vector or matrix.
`y`	A numerical vector or matrix.
`z`	A numerical vector or matrix.
`type`	In case that all x, y, and z are vectors the user may select the type = 2 which is even faster, but at the expense of requiring more memory.
`R`	The number of permutations to implement. If R = 1, the the asymptotic p-value is returned only.

Details

Hypothesis testing using the unbiased partial distance correlation between x and y conditioning on z is computed. **Note:** currently, ony two cases are supported, all x, y, and z are vectors or they are all matrices with the same dimensions.

Value

A vector with the unbiased partial distance correlation, the permutation based p-value and the asymptotic p-value as proposed by Shen, Panda and Vogelstein (2022).

Author(s)

Michail Tsagris and Nikolaos Kontemeniotis .

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr> and Nikolaos Kontemeniotis <kontemeniotisn@gmail.com>.

References

Szekely G. J. and Rizzo M. L. (2014). Partial Distance Correlation with Methods for Dissimilarities. The Annals of Statistics, 42(6): 2382–2412.

Shen C., Panda S. and Vogelstein J. T. (2022). The Chi-Square Test of Distance Correlation. Journal of Computational and Graphical Statistics, 31(1): 254–262.

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See Also

pdcor

Examples

```
x <- iris[, 1]
y <- iris[, 2]
z <- iris[, 3]
pdcor.test(x, y, z)
```

`Many pPartial distance correlations`

Many partial distance correlations

Description

Many partial distance correlations.

Usage

```
mpdcor(y, x, z)
```

Arguments

y	A numerical vector.
x	A numerical matrix.
z	A numerical vector.

Details

This computes the unbiased pdcor between y and each column of x, conditional on the vector z.

Value

A vector with many unbiased partial distance correlations.

Author(s)

Michail Tsagris.

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>.

References

Szekely G. J. and Rizzo M. L. (2014). Partial Distance Correlation with Methods for Dissimilarities. The Annals of Statistics, 42(6): 2382–2412.

Szekely G. J. and Rizzo M. L. (2023). The Energy of Data and Distance Correlation. Chapman and Hall/CRC.

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See Also

pdcor, mpdcor.test

Examples

```
y <- iris[, 1]
x <- matrix( rnorm(150 * 10), ncol = 10 )
z <- iris[, 2]
mpdcor(y, x, z)
pdcor(y, x[, 1], z)
```

`Partial distance correlation`

Partial distance correlation

Description

Partial distance correlation.

Usage

```
pdcor(x, y, z)
```

Arguments

x	A numerical vector or matrix.
y	A numerical vector or matrix.
z	A numerical vector or matrix.

Details

The unbiased partial distance correlation between x and y conditioning on z is computed. **Note:** currently, ony two cases are supported, all x, y, and z are vectors or they are all matrices with the same dimensions.

Value

The unbiased partial distance correlation.

Author(s)

Michail Tsagris.

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>.

References

Szekely G. J. and Rizzo M. L. (2014). Partial Distance Correlation with Methods for Dissimilarities. The Annals of Statistics, 42(6): 2382–2412.

Szekely G. J. and Rizzo M. L. (2023). The Energy of Data and Distance Correlation. Chapman and Hall/CRC.

Tsagris M. and Papadakis M. (2025). Fast and light-weight energy statistics using the R package Rfast. https://arxiv.org/abs/2501.02849

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See Also

pdcor.test, mpdcor

Examples

```
x <- iris[, 1]
y <- iris[, 2]
z <- iris[, 3]
pdcor(x, y, z)
```

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