

# Package ‘pdcor’

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**Type** Package

**Title** Fast and Light-Weight Partial Distance Correlation

**Version** 1.3

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**Author** Michail Tsagris [aut, cre],  
Nikolaos Kontemeniotis [aut]

**Maintainer** Michail Tsagris <mtsagris@uoc.gr>

**Depends** R (>= 4.0)

**Imports** dcov, rangen, Rfast, stats

**Suggests** Rfast2

## 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)

**NeedsCompilation** no

**Repository** CRAN

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

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**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**

Package: pdcor  
Type: Package  
Version: 1.3  
Date: 2026-03-25  
License: GPL-2

**Maintainers**

Michail Tsagris <mtsagris@uoc.gr>.

**Author(s)**

Michail Tsagris <mtsagris@uoc.gr> and Nikolaos Kontemeniotis <kontemeniotisn@gmail.com>.

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Hypothesis testing for many partial distance correlations  
*Hypothesis testing for many partial distance correlations*

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**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](mailto: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.

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>

Kontemeniotis N., Vargiakakis R. and Tsagris M. (2025). On independence testing using the (partial) distance correlation. <https://arxiv.org/abs/2506.15659v1>

**See Also**

[mpdcor](#), [pdcor.test](#)

**Examples**

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

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Hypothesis testing for the partial distance correlation

*Hypothesis testing for the partial distance correlation*

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## 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, only 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.

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

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Kontemeniotis N., Vargiakakis R. and Tsagris M. (2025). On independence testing using the (partial) distance correlation. <https://arxiv.org/abs/2506.15659v1>

### See Also

[pdcor](#)

### Examples

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

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Many pPartial distance correlations

*Many partial distance correlations*

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### 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](mailto: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)
```

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Partial distance correlation

*Partial distance correlation*

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## 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, only 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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