Package 'CMDMeasure'

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Title Conditional Mean Dependence Measures via Energy Statistics

Version 1.0.0

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Description Implementation of conditional mean dependence measures and conditional mean independence tests in Shao, X., and Zhang, J. (2014) <doi:10.1080/01621459.2014.887012> and Park, T., et al. (2015) <doi:10.1214/15-EJS1047>.

Depends R (>= 3.4.0)

Suggests testthat (>= 2.0.0), energy (>= 1.7-0)

License GPL (>= 2)

LazyData true

RoxygenNote 6.0.1

Collate 'CMDMeasure-package.R' 'functions.R' 'cmdm.R' 'cmdm_test.R'

R topics documented:

`CMDMeasure-package` *Conditional Mean Dependence Measures via Energy Statistics*

Description

CMDMeasure: A package for mutual dependence measures via energy statistics

Details

The CMDMeasure package provides measures of conditional mean dependence and tests of conditional mean independence.

Measuring conditional mean dependence

The conditional mean dependence measures include:

- asymmetric measure $\mathcal{R}_n$ based on distance covariance $\mathcal{V}_n$
- symmetric measure $\mathcal{S}_n$ based on distance covariance $\mathcal{V}_n$
- complete measure $\mathcal{Q}_n$ based on complete V-statistics
- simplified complete measure $\mathcal{Q}_n^\star$ based on incomplete V-statistics
- asymmetric measure $\mathcal{J}_n$ based on complete measure $\mathcal{Q}_n$
- simplified asymmetric measure $\mathcal{J}_n^\star$ based on simplified complete measure $\mathcal{Q}_n^\star$
- symmetric measure $\mathcal{I}_n$ based on complete measure $\mathcal{Q}_n$
- simplified symmetric measure $\mathcal{I}_n^\star$ based on simplified complete measure $\mathcal{Q}_n^\star$

Testing conditional mean independence

The conditional mean independence tests based on the conditional mean dependence measures are implemented as permutation tests.

Author(s)

Ze Jin <zj58@cornell.edu>, Shun Yao <shunyao2@illinois.edu>,
Xiaofeng Shao <xshao@illinois.edu>, David S. Matteson <matteson@cornell.edu>

MDD *Mutual Dependence Measures*

Description

`cmdm` measures mutual dependence of all components in `X`, where each component contains one variable (univariate) or more variables (multivariate).

Usage

```
MDD(x, y)
```

Arguments

`x`	A matrix or data frame, where rows represent samples, and columns represent variables.
`y`	A matrix or data frame, where rows represent samples, and columns represent variables.

Value

`cmdm` returns a list including the following components:

`stat`	The value of the mutual dependence measure.
`dist`	The distances between all components from all samples.

References

Shao, X., and Zhang, J. (2014). Martingale difference correlation and its use in high-dimensional variable screening. Journal of the American Statistical Association, 109(507), 1302-1318. https://arxiv.org/abs/1709.02532.

Park, T., Shao, X., and Yao, S. (2015). Partial martingale difference correlation. Electronic Journal of Statistics, 9(1), 1492-1517. https://arxiv.org/abs/1709.02532.

Examples

```
# X, Y is a 10 x 3 matrix with 10 samples and 3 variables
X <- matrix(rnorm(10 * 3), 10, 3)
Y <- matrix(rnorm(10 * 3), 10, 3)
# assume X = (X1, X2) where X1 is 1-dim, X2 is 2-dim
MDD(X, Y)
```

`MDD2` *Mutual Dependence Measures*

Description

`cmdm` measures mutual dependence of all components in `X`, where each component contains one variable (univariate) or more variables (multivariate).

Usage

```
MDD2(x, y)
```

Arguments

`x`	A matrix or data frame, where rows represent samples, and columns represent variables.
`y`	A matrix or data frame, where rows represent samples, and columns represent variables.

Value

`cmdm` returns a list including the following components:

`stat`	The value of the mutual dependence measure.
`dist`	The distances between all components from all samples.

References

Shao, X., and Zhang, J. (2014). Martingale difference correlation and its use in high-dimensional variable screening. Journal of the American Statistical Association, 109(507), 1302-1318. https://arxiv.org/abs/1709.02532.

Park, T., Shao, X., and Yao, S. (2015). Partial martingale difference correlation. Electronic Journal of Statistics, 9(1), 1492-1517. https://arxiv.org/abs/1709.02532.

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# assume X = (X1, X2) where X1 is 1-dim, X2 is 2-dim
MDD(X, Y)
```

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