

Package ‘BSSprep’

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Type Package

Title Whitening Data as Preparation for Blind Source Separation

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Description Whitening is the first step of almost all blind source separation (BSS) methods. A fast implementation of whitening for BSS is implemented to serve as a lightweight dependency for packages providing BSS methods.

License GPL (>= 2)

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BSSprep-package

Whitening Data as Preparation for Blind Source Separation

Description

Whitening is the first step of almost all blind source separation (BSS) methods. A fast implementation of whitening for BSS is implemented to serve as a lightweight dependency for packages providing BSS methods.

Details

Package: BSSprep
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License: GPL (≥ 2)

This package contains the single function [BSSprep](#) for whitening multivariate data as a preprocessing step for blind source separation (BSS). The package is meant as a fast and lightweight dependency for packages providing BSS methods as whitening is almost always the first step.

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BSSprep*Whitening of Multivariate Data*

Description

A function for data whitening.

Usage

BSSprep(X)

Arguments

X A numeric matrix. Missing values are not allowed.

Details

A p -variate $\mathbf{Y}$ with T observations is whitened, i.e. $\mathbf{Y} = \mathbf{S}^{-1/2}(\mathbf{X}_t - \frac{1}{T} \sum_{t=1}^T \mathbf{X}_t)$, where $\mathbf{S}$ is the sample covariance matrix of $\mathbf{X}$.

This is often need as a preprocessing step like in almost all blind source separation (BSS) methods. The function is implemented using C++ and returns the whitened data matrix as well as the ingredients to back transform.

Value

A list containing the following components:

<code>Y</code>	The whitened data matrix.
<code>X.C</code>	The mean-centered data matrix.
<code>COV.sqrt.i</code>	The inverse square root of the covariance matrix of $\mathbf{X}$.
<code>MEAN</code>	Mean vector of $\mathbf{X}$.

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Examples

```
n <- 100
X <- matrix(rnorm(10*n) - 1, nrow = n, ncol = 10)

res1 <- BSSprep(X)
res1$Y # The whitened matrix
colMeans(res1$Y) # should be close to zero
cov(res1$Y) # should be close to the identity matrix
res1$MEAN # Should hover around -1 for all 10 columns
```

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