Package 'BSSprep'

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Type Package

Title Whitening Data as Preparation for Blind Source Separation

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Imports Rcpp (>= 0.11.0)

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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)

NeedsCompilation yes

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`BSSprep-package` *Whitening Data as Preparation for Blind Source Separation*

Description

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Details

Package:	BSSprep
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Version:	0.1
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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.

Author(s)

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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:

`Y`	The whitened data matrix.
`X.C`	The mean-centered data matrix.
`COV.sqrt.i`	The inverse square root of the covariance matrix of X.
`MEAN`	Mean vector of X.

Author(s)

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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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