Package ‘JacobiEigen’

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Type Package
Title Classical Jacobi Eigenvalue Algorithm
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Imports Rcpp
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Description Implements the classical Jacobi algorithm for the
eigenvalues and eigenvectors of a real symmetric matrix, both in
pure 'R' and in 'C++' using 'Rcpp'. Mainly as a programming example
for teaching purposes.
License GPL (>= 2)
LinkingTo Rcpp
Suggests stats, knitr, dplyr, tidyr, ggplot2, rbenchmark, rmarkdown
VignetteBuilder knitr
NeedsCompilation yes
RoxygenNote 6.1.1
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The Jacobi Algorithm using Rcpp

Description

The Classical Jacobi Algorithm

Usage

Jacobi(x, symmetric = TRUE, only.values = FALSE, eps = 0)

Arguments

x A real symmetric matrix
symmetric a logical value. Is the matrix symmetric? (Only symmetric matrices are allowed.)
only.values A logical value: do you want only the eigenvalues?
eps an error tolerance. 0.0 implies .Machine$double.eps and sqrt(.Machine$double.eps)
if only.values = TRUE

Details

Eigenvalues and optionally, eigenvectors, of a real symmetric matrix using the classical Jacobi algorithm, (Jacobi, 1854)

Value

a list of two components as for base::eigen

Examples

V <- crossprod(matrix(runif(40, -1, 1), 8))
Jacobi(V)
identical(Jacobi(V), JacobiR(V))
all.equal(Jacobi(V)$values, base::eigen(V)$values)
The Jacobi Algorithm in Pure R

Description

The Jacobi Algorithm

Usage

JacobiR(x, symmetric = TRUE, only.values = FALSE, eps = if
(!only.values) .Machine$double.eps else sqrt(.Machine$double.eps))

Arguments

x a real symmetric matrix

symmetric a logical value. Is the matrix symmetric? (Only symmetric matrices are al-

only.values A logical value: Do you want only the eigenvalues?

eps a small positive error tolerance

Details

Eigenvalues and optionally, eigenvector of a real symmetric matrix using the classical Jacobi algo-

Value

a list of two components as for base::eigen

Examples

V <- crossprod(matrix(rnorm(25), 5))
JacobiR(V)
identical(Jacobi(V), JacobiR(V))
all.equal(Jacobi(V)$values, base::eigen(V)$values)
The Jacobi Algorithm using Rcpp with a stagewise rotation protocol

Description
The Classical Jacobi Algorithm with a stagewise protocol

Usage
JacobiS(x, symmetric = TRUE, only.values = FALSE, eps = 0)

Arguments
x A real symmetric matrix
symmetric a logical value. Is the matrix symmetric? (Only symmetric matrices are allowed.)
only.values A logical value: do you want only the eigenvalues?
eps an error tolerance. 0.0 implies .Machine$double.eps and sqrt(.Machine$double.eps)
if only.values = TRUE

Details
Eigenvalues and optionally, eigenvector, of a real symmetric matrix using the classical Jacobi algorithm, (Jacobi, 1846) using a stagewise rotation protocol

Value
a list of two components as for base::eigen

Examples
V <- crossprod(matrix(runif(40, -1, 1), 8))
JacobiS(V)
all.equal(JacobiS(V)$values, Jacobi(V)$values)
zapsmall(crossprod(JacobiS(V)$vectors, Jacobi(V)$vectors))
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