

Package ‘JacobiEigen’

March 10, 2019

Type Package

Title Classical Jacobi Eigenvalue Algorithm

Version 0.3-3

Date 2019-03-10

Author Bill Venables

Imports Rcpp

Maintainer Bill Venables <Bill.Venables@gmail.com>

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

VignetteBuilder knitr

NeedsCompilation yes

RoxygenNote 6.1.1

Repository CRAN

Date/Publication 2019-03-10 07:12:44 UTC

R topics documented:

Jacobi	2
JacobiR	3
JacobiS	4
Index	5

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 <code>.Machine\$double.eps</code> and <code>sqrt(.Machine\$double.eps)</code> if <code>only.values = TRUE</code>

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)
```

JacobiR

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 allowed.)
only.values	A logical value: Do you want only the eigenvalues?
eps	a small positive error tolerance

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(rnorm(25), 5))  
JacobiR(V)  
identical(Jacobi(V), JacobiR(V))  
all.equal(Jacobi(V)$values, base::eigen(V)$values)
```

 JacobiS

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

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

Details

Eigenvalues and optionally, eigenvectors, 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))
```

Index

Jacobi, [2](#)
JacobiR, [3](#)
JacobiS, [4](#)