Package 'umfpackr'

August 18, 2019

Type Package

Title Sparse linear algebra with UMFPACK

Version 0.4

Author Rob van Harrevelt [aut, cre]

Maintainer Rob van Harrevelt <rvanharrevelt@gmail.com>

Description This package contains methods for solving linear and non-linear systems of equations using the sparse linear algebra package UMFPACK.

License GPL-3

Encoding UTF-8

LazyData true

LinkingTo Rcpp

Imports Rcpp

Depends methods, Matrix

RoxygenNote 6.1.1

Suggests testthat, nleqslv

R topics documented:

`umf_solve` *Solves the system of linear equations $Ax = b$ using UMFPACK*

Description

Solves the system of linear equations $Ax = b$ using UMFPACK

Usage

```
umf_solve(a, b)
```

Arguments

a	an object of class dgCMatrix (see dgCMatrix-class)
b	the vector b

Value

the solution x

---

umf_solve_nl *Solves a system of non-linear equations $F(x) = 0$ using UMFPACK*

Description

Solves a system of non-linear equations $F(x) = 0$ using UMFPACK

Usage

```
umf_solve_nl(start, fn, jac, ..., control = list(), global = c("no",
  "cline"))
```

Arguments

start	initial guess of the solution x
fn	the function F
jac	a function returning the Jacobian of the function as a dgCMatrix object
...	arguments passed to fn and jac
control	a list with control parameters. See Details.
global	The global strategy. Possible values are "no" (no global strategy, the default) and "cline" (cubic line search) (cubic line search)

Details

Control options: Argument control is a named list containing one or more of the following components:

ftol The function value tolerance. Convergence is reached if the largest function value is smaller than ftol. The default value is 1e-8.

xtol The relative step size tolerance. When the relative step size is smaller than xtol, then the iteration is stopped. The default value is 1e-8.

maxiter The maximum number of iterations. The default is 20.

trace A logical. If TRUE then the progress of the iteraton is printed. The default is FALSE.

`silent` A logical. If `TRUE` then all output is suppressed. The default is `FALSE`.

`allow_singular` A logical value (default `FALSE`) indicating if a small correction to the Jacobian is applied when it is singular or too ill-conditioned. The method used is similar to a Levenberg-Marquardt correction and is explained in Dennis and Schnabel (1996) on page 151.

Value

a list with the following components:

`solved`	A logical equal to `TRUE` if convergence of the function values has been achieved.
`iter`	the number of iterations
`x`	the final values of x
`fval`	the function value
`message`	A string equal to `"ok"` if a solution has been found. Otherwise it describes the reason why the iteration was stopped without success

Examples

```
library(umfpackr)

dslnex <- function(x, c) {
   y <- numeric(2)
   y[1] <- x[1]^2 + x[2]^2 - c
   y[2] <- exp(x[1]-1) + x[2]^3 - c
   y
}

jacdsln <- function(x, c) {
   n <- length(x)
   Df <- matrix(numeric(n*n),n,n)
   Df[1,1] <- 2*x[1]
   Df[1,2] <- 2*x[2]
   Df[2,1] <- exp(x[1]-1)
   Df[2,2] <- 3*x[2]^2

   return(as(Df, "dgCMatrix"))
}


xstart <- c(2,3)
print(umf_solve_nl(xstart, dslnex, jacdsln, c = 2,
                   control = list(trace = TRUE)))
```

Index