Package 'subplex'

February 23, 2020

Version 1.6

Date 2020-02-21

Title Unconstrained Optimization using the Subplex Algorithm

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Depends R(>= 2.5.1)

URL https://github.com/kingaa/subplex/

BugReports https://github.com/kingaa/subplex/issues/

Description The subplex algorithm for unconstrained optimization, developed by Tom Rowan <http://www.netlib.org/opt/subplex.tgz>.

Encoding UTF-8

RoxygenNote 6.1.1

Collate 'subplex-package.R' 'subplex.R'

NeedsCompilation yes

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Repository CRAN

Date/Publication 2020-02-23 17:30:03 UTC

R topics documented:

subplex-package *Subplex unconstrained optimization algorithm*

Description

The **subplex** package implements Tom Rowan's subspace-searching simplex algorithm for unconstrained minimization of a function.

Details

Subplex is a subspace-searching simplex method for the unconstrained optimization of general multivariate functions. Like the Nelder-Mead simplex method it generalizes, the subplex method is well suited for optimizing noisy objective functions. The number of function evaluations required for convergence typically increases only linearly with the problem size, so for most applications the subplex method is much more efficient than the simplex method.

Subplex was written in FORTRAN by Tom Rowan (Oak Ridge National Laboratory). The FORTRAN source code is maintained on the netlib repository (netlib.org).

Author(s)

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References

T. Rowan, "Functional Stability Analysis of Numerical Algorithms", Ph.D. thesis, Department of Computer Sciences, University of Texas at Austin, 1990.

See Also

subplex, optim

subplex *Minimization of a function by the subplex algorithm*

Description

subplex minimizes a function.

Usage

```
subplex(par, fn, control = list(), hessian = FALSE, ...)
```

Arguments

par	Initial guess of the parameters to be optimized over.
fn	The function to be minimized. Its first argument must be the vector of parameters to be optimized over. It should return a scalar result.
control	A list of control parameters, consisting of some or all of the following:

reltol The relative optimization tolerance for par. This must be a positive number. The default value is .Machine$double.eps.

maxit Maximum number of function evaluations to perform before giving up. The default value is 10000.

parscale The scale and initial stepsizes for the components of par. This must either be a single scalar, in which case the same scale is used for all parameters, or a vector of length equal to the length of par. For parscale to be valid, it must not be too small relative to par: if par + parscale = par in any component, parscale is too small. The default value is 1.

hessian	If hessian=TRUE, the Hessian of the objective at the estimated optimum will be numerically computed.
...	Additional arguments to be passed to the function fn.

Details

The convergence codes are as follows:

-2 invalid input

-1 number of function evaluations needed exceeds maxnfe

0 success: tolerance tol satisfied

1 limit of machine precision reached

For more details, see the source code.

Value

subplex returns a list containing the following:

par	Estimated parameters that minimize the function.
value	Minimized value of the function.
count	Number of function evaluations required.
convergence	Convergence code (see Details).
message	A character string giving a diagnostic message from the optimizer, or 'NULL'.
hessian	Hessian matrix.

Author(s)

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References

T. Rowan, "Functional Stability Analysis of Numerical Algorithms", Ph.D. thesis, Department of Computer Sciences, University of Texas at Austin, 1990.

See Also

optim

Examples

```
rosen <- function (x) {   ## Rosenbrock Banana function
  x1 <- x[1]
  x2 <- x[2]
  100*(x2-x1*x1)^2+(1-x1)^2
}
subplex(par=c(11,-33),fn=rosen)

rosen2 <- function (x) {
  X <- matrix(x,ncol=2)
  sum(apply(X,1,rosen))
}
subplex(par=c(-33,11,14,9,0,12),fn=rosen2,control=list(maxit=30000))
## compare with optim:
optim(par=c(-33,11,14,9,0,12),fn=rosen2,control=list(maxit=30000))

ripple <- function (x) {
  r <- sqrt(sum(x^2))
  1-exp(-r^2)*cos(10*r)^2
}
subplex(par=c(1),fn=ripple,hessian=TRUE)
subplex(par=c(0.1,3),fn=ripple,hessian=TRUE)
subplex(par=c(0.1,3,2),fn=ripple,hessian=TRUE)

rosen <- function (x, g = 0, h = 0) {   ## Rosenbrock Banana function (using names)
  x1 <- x['a']
  x2 <- x['b']-h
  100*(x2-x1*x1)^2+(1-x1)^2+g
}
subplex(par=c(b=11,a=-33),fn=rosen,h=22,control=list(abstol=1e-9,parscale=5),hessian=TRUE)
```

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