Package ‘subplex’

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Title Unconstrained Optimization using the Subplex Algorithm
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Depends R(>= 2.5.1)
Description The subplex algorithm for unconstrained optimization, developed by Tom Rowan <http://www.netlib.org/opt/subplex.tgz>.
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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


See Also

subplex, optim

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**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. 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 to1 satisfied
  1 limit of machine precision reached
  2 fstop reached. Currently, the option to use fstop is not implemented.

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.

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References


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(0.1,2),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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