NAME

CUTEST_cgrdh_threaded − CUTEst tool to evaluate constraints gradients, Hessian of Lagrangian function and gradient of objective/Lagrangian function.

SYNOPSIS

CALL CUTEST_cgrdh_threaded(status, n, m, X, Y, grlagf, G, jtrans, lj1, lj2, J_val, lh1, H_val, thread)

DESCRIPTION

The CUTEST_cgrdh_threaded subroutine evaluates the gradients of the general constraints and of either the objective function $f(x)$ or the Lagrangian function $l(x, y) = f(x) + y^T c(x)$ corresponding to the problem decoded from a SIF file by the script *sifdecode* at the point $(x, y) =$ (X,Y). It also evaluates the Hessian matrix of the Lagrangian function at (x, y). The gradients and matrices are stored in a dense format.

The problem under consideration is to minimize or maximize an objective function $f(x)$ over all $x \in R^n$ subject to general equations $c_i(x) = 0$, $(i \in 1, \ldots, m_E)$, general inequalities $c_i^l(x) \le c_i(x) \le c_i^u(x)$, $(i \in m_E + 1, \ldots, m)$, and simple bounds $x^l \le x \le x^u$. The objective function is group-partially separable and all constraint functions are partially separable.

ARGUMENTS

The arguments of CUTEST_cgrdh_threaded are as follows

status [out] - integer
: the outputr status: 0 for a succesful call, 1 for an array allocation/deallocation error, 2 for an array bound error, 3 for an evaluation error, 4 for an out-of-range thread,

n [in] - integer
: the number of variables for the problem,

m [in] - integer
: the total number of general constraints,

X [in] - real/double precision
: an array which gives the current estimate of the solution of the problem,

Y [in] - real/double precision
: an array which should give the Lagrange multipliers whenever grlagf is set .TRUE. but need not otherwise be set,

grlagf [in] - logical
: a logical variable which should be set .TRUE. if the gradient of the Lagrangian function is required and .FALSE. if the gradient of the objective function is sought,

G [out] - real/double precision
: an array which gives the value of the gradient of the objective function evaluated at X (GRLAGF = .FALSE.) or of the Lagrangian function evaluated at X and Y (GRLAGF = .TRUE.),

jtrans [in] - logical
: a logical variable which should be set to .TRUE. if the transpose of the constraint Jacobian is required and to .FALSE. if the Jacobian itself is wanted. The Jacobian matrix is the matrix whose i-th row is the gradient of the i-th constraint function,

lj1 [in] - integer
: the actual declared size of the leading dimension of J_val (with lj1 no smaller than n if jtrans is .TRUE. or m if jtrans is .FALSE.),

lj2 [in] - integer
: the actual declared size of the second dimension of J_val (with lj2 no smaller than m if jtrans is .TRUE. or n if jtrans is .FALSE.),

J_val [out] - real/double precision
: a two-dimensional array of dimension (lj1, lj2) which gives the value of the Jacobian matrix of the constraint functions, or its transpose, evaluated at X. If jtrans is .TRUE., the i,j-th component of the

array will contain the i-th derivative of the j-th constraint function. Otherwise, if jtrans is .FALSE., the i,j-th component of the array will contain the j-th derivative of the i-th constraint function.

lh1 [in] - integer
the actual declared size of the leading dimension of H_val (with lh1 no smaller than n),

H_val [out] - real/double precision
a two-dimensional array which gives the value of the Hessian matrix of the Lagrangian function evaluated at X and Y,

thread [in] - integer
thread chosen for the evaluation; threads are numbered from 1 to the value threads set when calling CUTEST_csetup_threaded.

AUTHORS

I. Bongartz, A.R. Conn, N.I.M. Gould, D. Orban and Ph.L. Toint

SEE ALSO

CUTEr (and SifDec): A Constrained and Unconstrained Testing Environment, revisited,
N.I.M. Gould, D. Orban and Ph.L. Toint,
ACM TOMS, **29**:4, pp.373-394, 2003.

CUTE: Constrained and Unconstrained Testing Environment, I. Bongartz, A.R. Conn, N.I.M. Gould and Ph.L. Toint, TOMS, **21**:1, pp.123-160, 1995.

cutest_ugrdh_threaded(3M), sifdecode(1).

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the actual declared size of the second dimension of J_val (with lj2 no smaller than m if jtrans is .TRUE. or n if jtrans is .FALSE.),

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lh1 [in] - integer
the actual declared size of the leading dimension of H_val (with lh1 no smaller than n),

H_val [out] - real/double precision
a two-dimensional array which gives the value of the Hessian matrix of the Lagrangian function evaluated at X and Y,

thread [in] - integer
thread chosen for the evaluation; threads are numbered from 1 to the value threads set when calling CUTEST_csetup_threaded.

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