

NAME

CUTEST_chprod – CUTEst tool to form the matrix-vector product of a vector with the Hessian matrix of the Lagrangian.

SYNOPSIS

CALL CUTEST_chprod(status, n, m, goth, X, Y, VECTOR, RESULT)

DESCRIPTION

The CUTEST_chprod subroutine forms the product of a vector with the Hessian matrix of the Lagrangian function $l(x, y) = f(x) + y^T c(x)$ corresponding to the problem decoded from a SIF file by the script *sifdecoder* at the point $(x, y) = (X, Y)$.

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

ARGUMENTS

The arguments of CUTEST_chprod are as follows

status [out] - integer

the output status: 0 for a successful call, 1 for an array allocation/deallocation error, 2 for an array bound error, 3 for an evaluation error,

n [in] - integer

the number of variables for the problem,

m [in] - integer

the total number of general constraints,

goth [in] - logical

a logical variable which specifies whether the first and second derivatives of the groups and elements have already been set (goth = .TRUE.) or if they should be computed (goth = .FALSE.),

X [in] - real/double precision

when goth = .FALSE., the derivatives will be evaluated at X. Otherwise X is not used.

Y [in] - real/double precision

when goth = .FALSE., the derivatives will be evaluated with Lagrange multipliers Y. Otherwise Y is not used,

VECTOR [in] - real/double precision

an array which gives the vector whose product with the Hessian is required,

RESULT [out] - real/double precision

an array which gives the result of multiplying the Hessian by VECTOR.

NOTE

goth should be set to .TRUE. whenever

(1)

a call has been made to CUTEST_cdh, CUTEST_csh, CUTEST_cgrdh or CUTEST_csgrsh at the current point, or

(2)

a previous call to CUTEST_chprod, with goth = .FALSE., at the current point has been made.

Otherwise, it should be set .FALSE.

AUTHORS

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

SEE ALSO

CUTEst: a Constrained and Unconstrained Testing Environment with safe threads,

N.I.M. Gould, D. Orban and Ph.L. Toint,

Technical Report, Rutherford Appleton Laboratory, 2013.

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, ACM TOMS, **21**:1, pp.123-160, 1995.

cutest_uhprod(3M), sifdecoder(1).

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