

NAME

CUTEST_cohprods – CUTEst tool to form the matrix-vector products of a vector with the Hessian matrix of the objective function.

SYNOPSIS

CALL CUTEST_cohprods(status, n, goth, X, VECTOR, nnzohp, loh, RESULT, IND)

For real rather than double precision arguments, instead

CALL CUTEST_cohprods_s(...)

DESCRIPTION

The CUTEST_cohprods subroutine forms the product of a vector with the Hessian matrix of the objective function $f(x)$ corresponding to the problem decoded from a SIF file by the script *sifdecoder* at the point $x = X$.

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 $c_i^l \leq c_i(x) \leq c_i^u$ ($i \in m_E + 1, \dots, m$), 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_cohprods 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,

goth [in] - logical

a logical variable which specifies whether the second derivatives of the groups and elements, and the indexing information held in IND (see below) have already been set (goth = .TRUE.) or if this information should be computed (goth = .FALSE.).

X [in] - real/double precision

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

VECTOR [in] - real/double precision

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

nnzohp [out] - integer

the total number of nonzero entries required to store the product of the objective Hessian with a vector. This should be the value obtained from the last call to the subroutine if goth = .TRUE., but need not be set otherwise.

loh [in] - integer

a variable that specifies the declared lengths of IND and RESULT. The precise length required may be found by calling *CUTEST_cdimohp* prior to *CUTEST_cohprodsp*,

RESULT [out] - real/double precision

an array that gives the values of the nonzeros in the result obtained by multiplying the objective Hessians by VECTOR. The values are stored in RESULT(1:nnzohp).

IND [inout] - integer

an array that gives the indices of the nonzeros in the result obtained by multiplying the objective Hessian by VECTOR. The indices are stored in IND(1:nnzohp), and will match the values stored in RESULT. This array should be passed unchanged from the last call to the subroutine if goth = .TRUE., but need not be set otherwise.

NOTE

goth should be set to `.TRUE.` only when a previous call to `CUTEST_cohprods`, with `goth = .FALSE.`, at the current point has been made. Otherwise, it should be set `.FALSE.`

AUTHORS

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SEE ALSO

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

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

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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.

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

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`cutest_cdimohp(3M)`, `sifdecoder(1)`.