NAME
CUTEST_ugrsh – CUTEst tool to evaluate the gradient and sparse Hessian matrix in coordinate format.

SYNOPSIS
CALL CUTEST_ugrsh(status, n, X, G, nnzh, lh, H_val, H_row, H_col)

DESCRIPTION
The CUTEST_ugrsh subroutine evaluates the gradient and Hessian matrix of the objective function of the problem decoded from a SIF file by the script *sifdecoder* at the point X. This Hessian matrix is stored as a sparse matrix in coordinate format.

The problem under consideration is to minimize or maximize an objective function $f(x)$ over all $x \in R^n$ subject to the simple bounds $x^l \leq x \leq x^{u.}$ The objective function is group-partially separable.

ARGUMENTS
The arguments of CUTEST_ugrsh 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,

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

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

G [out] - real/double precision
an array which gives the value of the gradient of the objective function evaluated at X,

nnzh [out] - integer
the number of nonzeros in H_val,

lh [in] - integer
the actual declared dimensions of H_val, H_row and H_col,

H_val [out] - real/double precision
an array which gives the value of the Hessian matrix of the objective function evaluated at X. The i-th entry of H_val gives the value of the nonzero in row H_row(i) and column H_col(i). Only the upper triangular part of the Hessian is stored,

H_row [out] - integer
an array which gives the row indices of the nonzeros of the Hessian matrix of the objective function evaluated at X,

H_col [out] - integer
an array which gives the column indices of the nonzeros of the Hessian matrix of the objective function evaluated at X.

NOTE
Calling this routine is more efficient than separate calls to CUTEST_ugr and CUTEST_ush.

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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,
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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_csgrsh(3M), sifdecoder(1).