

NAG Toolbox

nag_correg_ssqmat_to_corrmat (g02bw)

1 Purpose

nag_correg_ssqmat_to_corrmat (g02bw) calculates a matrix of Pearson product-moment correlation coefficients from sums of squares and cross-products of deviations about the mean.

2 Syntax

```
[r, ifail] = nag_correg_ssqmat_to_corrmat(m, r)
```

```
[r, ifail] = g02bw(m, r)
```

3 Description

nag_correg_ssqmat_to_corrmat (g02bw) calculates a matrix of Pearson product-moment correlation coefficients from sums of squares and cross-products about the mean for observations on m variables which can be computed by a single call to nag_correg_ssqmat (g02bu) or a series of calls to nag_correg_ssqmat_update (g02bt). The sums of squares and cross-products are stored in an array packed by column and are overwritten by the correlation coefficients.

Let c_{jk} be the cross-product of deviations from the mean, for $j = 1, 2, \dots, m$ and $k = j, \dots, m$, then the product-moment correlation coefficient, r_{jk} is given by

$$r_{jk} = \frac{c_{jk}}{\sqrt{c_{jj}c_{kk}}}$$

4 References

None.

5 Parameters

5.1 Compulsory Input Parameters

1: **m** – INTEGER

m , the number of variables.

Constraint: $m \geq 1$.

2: **r**((**m** × **m** + **m**)/2) – REAL (KIND=nag_wp) array

Contains the upper triangular part of the sums of squares and cross-products matrix of deviations from the mean. These are stored packed by column, i.e., the cross-product between variable j and k , $k \geq j$, is stored in **r**(($k \times (k - 1)/2 + j$)).

5.2 Optional Input Parameters

None.

5.3 Output Parameters

1: **r**((**m** × **m** + **m**)/2) – REAL (KIND=nag_wp) array

The Pearson product-moment correlation coefficients.

These are stored packed by column corresponding to the input cross-products.

2: **ifail** – INTEGER

ifail = 0 unless the function detects an error (see Section 5).

6 Error Indicators and Warnings

Note: nag_correg_ssqmat_to_corrmat (g02bw) may return useful information for one or more of the following detected errors or warnings.

Errors or warnings detected by the function:

ifail = 1

On entry, **m** < 1.

ifail = 2 (*warning*)

A variable has a zero variance. All correlations involving the variable with zero variance will be returned as zero.

ifail = -99

An unexpected error has been triggered by this routine. Please contact NAG.

ifail = -399

Your licence key may have expired or may not have been installed correctly.

ifail = -999

Dynamic memory allocation failed.

7 Accuracy

The accuracy of nag_correg_ssqmat_to_corrmat (g02bw) is entirely dependent upon the accuracy of the elements of array **r**.

8 Further Comments

nag_correg_ssqmat_to_corrmat (g02bw) may also be used to calculate the correlations between parameter estimates from the variance-covariance matrix of the parameter estimates as is given by several functions in this chapter.

9 Example

A program to calculate the correlation matrix from raw data. The sum of squares and cross-products about the mean are calculated from the raw data by a call to nag_correg_ssqmat (g02bu). The correlation matrix is then calculated from these values.

9.1 Program Text

```
function g02bw_example
fprintf('g02bw example results\n\n');

wt = [ 0.1300  1.3070  0.3700];
x   = [ 9.1231  3.7011  4.5230;
        0.9310  0.0900  0.8870;
        0.0009  0.0099  0.0999];

[m, n] = size(x);
m      = nag_int(m);
```

```
% Calculate the sums of squares and cross-products matrix
[sw, wmean, c, ifail] = g02bu(x, 'wt', wt);

% Calculate the correlation matrix
[r, ifail] = g02bw(m, c);

mtitle = 'Correlation matrix: ';
uplo    = 'Upper';
diag    = 'Non-unit';
[ifail] = x04cc( ...
            uplo, diag, m, r, mtitle);
```

9.2 Program Results

g02bw example results

```
Correlation matrix:
      1      2      3
1  1.0000  0.9908  0.9903
2           1.0000  0.9624
3                1.0000
```
