

NAG Toolbox for MATLAB

g02bw

1 Purpose

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] = g02bw(m, r)
```

3 Description

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 g02bu or a series of calls to 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 variables $j = 1, 2, \dots, m$; $k = j, j + 1, \dots, m$, 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** – **int32 scalar**

m , the number of variables.

Constraint: $m \geq 1$.

2: **r**((**m** × **m** + **m**)/2) – **double 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 $\mathbf{r}(k \times (k - 1)/2 + j)$.

5.2 Optional Input Parameters

None.

5.3 Input Parameters Omitted from the MATLAB Interface

None.

5.4 Output Parameters

1: **r**((**m** × **m** + **m**)/2) – **double array**

Pearson product-moment correlation coefficients.

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

2: **ifail** – int32 scalar

0 unless the function detects an error (see Section 6).

6 Error Indicators and Warnings

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

ifail = 1

On entry, **m** < 1.

ifail = 2

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

7 Accuracy

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

8 Further Comments

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

```
m = int32(3);  
r = [8.75689620235916;  
     3.697844992253459;  
     1.59053509294466;  
     4.070728079123907;  
     1.686058157917487;  
     1.929668337915273];  
[rOut, ifail] = g02bw(m, r)
```

```
rOut =  
     1.0000  
     0.9908  
     1.0000  
     0.9903  
     0.9624  
     1.0000  
ifail =  
      0
```