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NAG Toolbox for MATLAB

g11bc

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1   Purpose

g11bc computes a marginal table from a table computed by g11ba or g11bb using a selected statistic.

2   Syntax

```
[stable, mcells, mdim, mlevel, auxt, ifail] = g11bc(stat, table, idim,
isdim, maxst, 'ncells', ncells, 'ndim', ndim)
```

3   Description

For a data set containing classification variables (known as factors) the functions g11ba and g11bb compute a table using selected statistics, for example the mean or the median. The table is indexed by the levels of the selected factors, for example if there were three factors A, B and C with 3, 2 and 4 levels respectively and the mean was to be tabulated the resulting table would be $3 \times 2 \times 4$ with each cell being the mean of all observations with the appropriate combination of levels of the three factors. In further analysis the table of means averaged over C for A and B may be required; this can be computed from the full table by taking the mean over the third dimension of the table, C.

In general, given a table computed by g11ba or g11bb, g11bc computes a sub-table defined by a subset of the factors used to define the table such that each cell of the sub-table is the selected statistic computed over the remaining factors. The statistics that can be used are the total, the mean, the median, the variance, the smallest and the largest value.

4   References

John J A and Quenouille M H 1977 *Experiments: Design and Analysis* Griffin

Kendall M G and Stuart A 1969 *The Advanced Theory of Statistics (Volume 1)* (3rd Edition) Griffin

West D H D 1979 Updating mean and variance estimates: An improved method *Comm. ACM* **22** 532–555

5   Parameters

5.1   Compulsory Input Parameters

1:     **stat – string**

Indicates which statistic is to be used to compute the marginal table.

If **stat** = 'T' the total.

If **stat** = 'A' the average or mean.

If **stat** = 'M' the median.

If **stat** = 'V' the variance.

If **stat** = 'L' the largest value.

If **stat** = 'S' the smallest value.

Constraint: **stat** = 'T', 'A', 'M', 'V', 'L' or 'S'.

2:     **table**(**ncells**) **– double array**

The table as computed by g11ba or g11bb.

3:     **idim**(**ndim**) – **int32 array**

The number of levels for each dimension of **table** as returned by g11ba or g11bb.

Constraint: **idim**$(i) \geq 2$, for $i = 1, 2, \ldots,$ **ndim**.

4:     **isdim**(**ndim**) – **int32 array**

Indicates which dimensions of **table** are to be included in the sub-table. If **isdim**$(i) > 0$ the dimension or factor indicated by **idim**(i) is to be included in the sub-table, otherwise it is excluded.

5:     **maxst** – **int32 scalar**

the maximum size of sub-table to be computed.

Constraint: **maxst** $\geq$ the product of the levels of the dimensions of **table** included in the sub-table, **stable**

5.2   Optional Input Parameters

1:     **ncells** – **int32 scalar**

Default: The dimension of the array **table**.

the number of cells in **table** as returned by g11ba or g11bb.

2:     **ndim** – **int32 scalar**

Default: The dimension of the arrays **idim**, **isdim**, **mlevel**. (An error is raised if these dimensions are not equal.)

the number of dimensions for **table** as returned by g11ba or g11bb.

Constraint: **ndim** ≥ 2.

5.3   Input Parameters Omitted from the MATLAB Interface

iwk, wk

5.4   Output Parameters

1:     **stable**(**maxst**) – **double array**

The first **mcells** elements contain the sub-table computed using the statistic indicated by **stat**. The table is stored in a similar way to **table** with the **mcells** cells stored so that for any two dimensions the index relating to the dimension given later in **idim** changes faster. For further details see Section 8.

2:     **mcells** – **int32 scalar**

The number of cells in the sub-table in **stable**.

3:     **mdim** – **int32 scalar**

The number of dimensions to the sub-table in **stable**.

4:     **mlevel**(**ndim**) – **int32 array**

The first **mdim** elements contain the number of levels for the dimensions of the sub-table in **stable**. The remaining elements are not referenced.

5:      **auxt**($*$) **– double array**

   Note: the dimension of the array **auxt** must be at least **maxst** if **stat** $=$ 'V', and at least 1 otherwise.

   If **stat** $=$ 'V' **auxt** contains the sub-table of means corresponding to the sub-table of variances in **stable**. Otherwise **auxt** is not referenced.

6:      **ifail – int32 scalar**

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

6   Error Indicators and Warnings

Errors or warnings detected by the function:

ifail $=$ 1

   On entry, **ndim** $<$ 2,
   or   **stat** $\neq$ 'T', 'A', 'M', 'V', 'L' or 'S'.

ifail $=$ 2

   On entry, **idim**(i) $\leq$ 1, for some $i = 1, 2, \ldots,$ **ndim**,
   or   **ncells** is incompatible with **idim**,
   or   the requested sub-table is of dimension 0,
   or   the requested sub-table is the full table,
   or   **maxst** is too small, the minimum value is returned in **mdim**.

7   Accuracy

Only applicable when **stat** $=$ 'V'. In this case a one pass algorithm is used as describe in West 1979.

8   Further Comments

The sub-tables created by g11bc and stored in **stable** and, depending on **stat**, also in **auxt** are stored in the following way. Let there be m dimensions defining the table with dimension k having l_k levels, then the cell defined by the levels $i_1, i_2, \ldots, i_m$ of the factors is stored in sth cell given by

$$s = 1 + \sum_{k=1}^{m} [(i_k - 1)c_k],$$

where

$$c_j = \prod_{k=j+1}^{m} l_k \qquad \text{for } j = 1, 2, \ldots, n - 1 \qquad \text{and} \qquad c_m = 1.$$

9   Example

```
stat = 'A';
table = [274;
     361;
     253;
     325;
     317;
     339;
     326;
     402;
     336;
     379;
     345;
```

```
      361;
      352;
      334;
      318;
      339;
      393;
      358;
      350;
      340;
      203;
      397;
      356;
      298;
      382;
      376;
      355;
      418;
      387;
      379;
      432;
      339;
      293;
      322;
      417;
      342;
      82;
      297;
      133;
      306;
      352;
      361;
      220;
      333;
      270;
      388;
      379;
      274;
      336;
      307;
      266;
      389;
      333;
      353];
idim = [int32(3);
      int32(6);
      int32(3)];
isdim = [int32(0);
      int32(1);
      int32(1)];
maxst = int32(54);
[stable, mcells, mdim, mlevel, auxt, ifail] = g11bc(stat, table, idim,
isdim, maxst)
```

```
stable =
      array elided
mcells =
          18
mdim =
           2
mlevel =
           6
           3
           0
auxt =
      0
ifail =
           0
```