

NAG Library Routine Document

G11SBF

Note: before using this routine, please read the Users' Note for your implementation to check the interpretation of ***bold italicised*** terms and other implementation-dependent details.

1 Purpose

G11SBF is a service routine which may be used prior to calling G11SAF to calculate the frequency distribution of a set of dichotomous score patterns.

2 Specification

```
SUBROUTINE G11SBF(IP, N, NS, X, LDX, IRL, IFAIL)
INTEGER          IP, N, NS, LDX, IRL(N), IFAIL
LOGICAL          X(LDX,IP)
```

3 Description

When each of n individuals responds to each of p dichotomous variables the data assumes the form of the matrix X defined below

$$X = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1p} \\ x_{21} & x_{22} & \dots & x_{2p} \\ \vdots & \vdots & & \vdots \\ x_{n1} & x_{n2} & \dots & x_{np} \end{bmatrix} = \begin{bmatrix} \underline{x}_1 \\ \underline{x}_2 \\ \vdots \\ \underline{x}_n \end{bmatrix},$$

where the x take the value of 0 or 1 and $\underline{x}_l = (x_{l1}, x_{l2}, \dots, x_{lp})$, for $l = 1, 2, \dots, n$, denotes the score pattern of the l th individual. G11SBF calculates the number of different score patterns, s , and the frequency with which each occurs. This information can then be passed to G11SAF.

4 References

None.

5 Parameters

- | | | |
|----|--|---------------------|
| 1: | IP – INTEGER | <i>Input</i> |
| | <i>On entry:</i> p , the number of dichotomous variables. | |
| | <i>Constraint:</i> $IP \geq 3$. | |
| 2: | N – INTEGER | <i>Input</i> |
| | <i>On entry:</i> n , the number of individuals in the sample. | |
| | <i>Constraint:</i> $N \geq 7$. | |
| 3: | NS – INTEGER | <i>Output</i> |
| | <i>On exit:</i> the number of different score patterns, s . | |
| 4: | X(LDX,IP) – LOGICAL array | <i>Input/Output</i> |
| | <i>On entry:</i> $X(i, j)$ must be set equal to .TRUE. if $x_{ij} = 1$, and .FALSE. if $x_{ij} = 0$, for $i = 1, 2, \dots, n$ and $j = 1, 2, \dots, p$. | |
| | <i>On exit:</i> the first s rows of X contain the s different score patterns. | |

- 5: LDX – INTEGER *Input*
On entry: the first dimension of the array X as declared in the (sub)program from which G11SBF is called.
Constraint: $LDX \geq N$.
- 6: IRL(N) – INTEGER array *Output*
On exit: the frequency with which the l th row of X occurs, for $l = 1, 2, \dots, s$.
- 7: IFAIL – INTEGER *Input/Output*
On entry: IFAIL must be set to 0, -1 or 1. If you are unfamiliar with this parameter you should refer to Section 3.3 in the Essential Introduction for details.
On exit: IFAIL = 0 unless the routine detects an error (see Section 6).
 For environments where it might be inappropriate to halt program execution when an error is detected, the value -1 or 1 is recommended. If the output of error messages is undesirable, then the value 1 is recommended. Otherwise, if you are not familiar with this parameter, the recommended value is 0. **When the value -1 or 1 is used it is essential to test the value of IFAIL on exit.**

6 Error Indicators and Warnings

If on entry IFAIL = 0 or -1, explanatory error messages are output on the current error message unit (as defined by X04AAF).

Errors or warnings detected by the routine:

IFAIL = 1

On entry, IP < 3,
 or N < 7,
 or LDX < N.

7 Accuracy

Exact.

8 Further Comments

The time taken by G11SBF is small and increases with n .

9 Example

A program to count the frequencies of different score patterns in the following list:

Score Patterns
 000
 010
 111
 000
 001
 000
 000
 110
 001
 011

9.1 Program Text

```

*      G11SBF Example Program Text
*      Mark 14 Revised. NAG Copyright 1989.
*      .. Parameters ..
      INTEGER          NIN, NOUT
      PARAMETER        (NIN=5,NOUT=6)
      INTEGER          NMAX, IPMAX, LDX
      PARAMETER        (NMAX=100,IPMAX=5,LDX=NMAX)
*      .. Local Scalars ..
      INTEGER          I, IFAIL, IP, J, N, NS
*      .. Local Arrays ..
      INTEGER          IRL(NMAX)
      LOGICAL          X(LDX,IPMAX)
*      .. External Subroutines ..
      EXTERNAL         G11SBF
*      .. Executable Statements ..
      WRITE (NOUT,*) 'G11SBF Example Program Results'
*      Skip heading in data file
      READ (NIN,*)
      READ (NIN,*) N, IP
      IF (N.GT.0 .AND. N.LE.NMAX .AND. IP.GT.0 .AND. IP.LE.IPMAX) THEN
        DO 20 I = 1, N
          READ (NIN,*) (X(I,J),J=1,IP)
20      CONTINUE
          IFAIL = 1
*
          CALL G11SBF(IP,N,NS,X,LDX,IRL,IFAIL)
*
          IF (IFAIL.EQ.0) THEN
            WRITE (NOUT,*)
            WRITE (NOUT,*) 'Frequency      Score pattern'
            WRITE (NOUT,*)
            DO 40 I = 1, NS
              WRITE (NOUT,99999) IRL(I), (X(I,J),J=1,IP)
40      CONTINUE
            ELSE
              WRITE (NOUT,99998) IFAIL
            END IF
          END IF
*
99999 FORMAT (1X,I5,12X,5L2)
99998 FORMAT (1X,' ** G11SBF returned with IFAIL = ',I5)
      END

```

9.2 Program Data

```

G11SBF Example Program Data
10 3
F F F
F T F
T T T
F F F
F F T
F F F
F F F
T T F
F F T
F T T

```

9.3 Program Results

G11SBF Example Program Results

```

Frequency      Score pattern

      4              F F F

```

1	F	T	F
1	T	T	T
2	F	F	T
1	T	T	F
1	F	T	T
