

NAG Toolbox for MATLAB

m01da

1 Purpose

m01da ranks a vector of double numbers in ascending or descending order.

2 Syntax

```
[irank, ifail] = m01da(rv, m1, order, 'm2', m2)
```

3 Description

m01da uses a variant of list-merging, as described by Knuth 1973 pp 165-166. The function takes advantage of natural ordering in the data, and uses a simple list insertion in a preparatory pass to generate ordered lists of length at least 10. The ranking is stable: equal elements preserve their ordering in the input data.

4 References

Knuth D E 1973 *The Art of Computer Programming (Volume 3)* (2nd Edition) Addison–Wesley

5 Parameters

5.1 Compulsory Input Parameters

1: **rv(m2)** – double array

Elements **m1** to **m2** of **rv** must contain double values to be ranked.

2: **m1** – int32 scalar

The index of the first element of **rv** to be ranked.

Constraint: **m1** > 0.

3: **order** – string

If **order** = 'A', the values will be ranked in ascending (i.e., nondecreasing) order.

If **order** = 'D', into descending order.

Constraint: **order** = 'A' or 'D'.

5.2 Optional Input Parameters

1: **m2** – int32 scalar

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

the index of the last element of **rv** to be ranked.

Constraint: **m2** ≥ **m1**.

5.3 Input Parameters Omitted from the MATLAB Interface

None.

5.4 Output Parameters

1: **irank(m2) – int32 array**

Elements **m1** to **m2** of **irank** contain the ranks of the corresponding elements of **rv**. Note that the ranks are in the range **m1** to **m2**: thus, if **rv(i)** is the first element in the rank order, **irank(i)** is set to **m1**.

2: **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, **m2** < 1,
or **m1** < 1,
or **m1** > **m2**.

ifail = 2

On entry, **order** is not 'A' or 'D'.

7 Accuracy

Not applicable.

8 Further Comments

The average time taken by the function is approximately proportional to $n \times \log n$, where $n = \mathbf{m2} - \mathbf{m1} + 1$.

9 Example

```
rv = [5.3;
      4.6;
      7.8;
      1.7;
      5.3;
      9.9;
      3.2;
      4.3;
      7.8;
      4.5;
      1.2;
      7.6];
m1 = int32(1);
order = 'Ascending';
[irank, ifail] = m01da(rv, m1, order)

irank =
       7
       6
      10
       2
       8
      12
       3
       4
```

	11
	5
	1
	9
ifail =	0
