

NAG Toolbox for MATLAB

m01db

1 Purpose

m01db ranks a vector of integer numbers in ascending or descending order.

2 Syntax

```
[irank, ifail] = m01db(iv, m1, order, 'm2', m2)
```

3 Description

m01db 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: **iv(m2)** – **int32** array
Elements **m1** to **m2** of **iv** must contain integer values to be ranked.
- 2: **m1** – **int32** scalar
The index of the first element of **iv** 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 array **irank**.
m2 must specify the index of the last element of **iv** 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 **iv**. Note that the ranks are in the range **m1** to **m2**: thus, if **iv**(*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

```
iv = [int32(34);
      int32(44);
      int32(89);
      int32(64);
      int32(69);
      int32(69);
      int32(23);
      int32(1);
      int32(999);
      int32(65);
      int32(22);
      int32(76)];
m1 = int32(1);
order = 'Descending';
[irank, ifail] = m01db(iv, m1, order)

irank =
     9
     8
     2
     7
     4
     5
    10
    12
```

	1
	6
	11
	3
ifail =	0