Case Study-sorted/unsorted-ness

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Using number of inversions as a tool to measure the degree of sorted/unsorted-ness of a list.

A = [3, 6, 1, 33, 8, 5, 11, 88, 23, 0]

B = [5, 1, 33, 6, 88, 3, 0, 11, 23, 8]

C = [33, 88, 3, 5, 6, 8, 11, 23, 1, 0]

Total number of elements=N= 10

As we will make pairs so r=2

Total combinations$=\frac{N!}{r!*(N-r)!}=\frac{10!}{2!*(10-2)!}=\frac{10!}{2!*8!}=\frac{10*9*8!}{2!*8!}$

$=\frac{90}{2}=45$

A = {3, 6, 1, 33, 8, 5, 11, 88, 23, 0}

Total pairs:

{3,6},{3,1},{3,33},{3,8},{3,5},{3,11},{3,88},{3,23},{3,0}

{6,1},{6,33},{6,8},{6,5},{6,11},{6,88},{6,23},{6,0}

{1,33},{1,8},{1,5},{1,11},{1,88},{1,23},{1,0}

{33,8},{33,5},{33,11},{33,88},{33,23},{33,0}

{8,5},{8,11},{8,88},{8,23},{8,0}

{5,11},{5,88},{5,23},{5,0}

{11,88},{11,23},{11,0}

{88,23},{88,0}

{23,0}

TOTAL NUMBER OF PAIRS=45

INVERSIONS=18

ORDERED PAIRS=27

B = [5, 1, 33, 6, 88, 3, 0, 11, 23, 8]

Total pairs:

{5,1},{5,33},{5,6},{5,88},{5,3},{5,0},{5,11},{5,23},{5,8}

{1,33},{1,6},{1,88},{1,3},{1,0},{1,11},{1,23},{1,8}

{33,6},{33,88},{33,3},{33,0},{33,11},{33,23},{33,8}

{6,88},{6,3},{6,0},{6,11},{6,23},{6,8}

{88,3},{88,0},{88,11},{88,23},{88,8}

{3,0},{3,11},{3,23},{3,8}

{0,11},{0,23},{0,8}

{11,23},{11,8}

{23,8}

TOTAL NUMBER OF PAIRS= 45

INVERSIONS= 23

ORDERED PARIS= 22

C = {33, 88, 3, 5, 6, 8, 11, 23, 1, 0}

Total pairs:

{33,88},{33,3},{33,5},{33,6},{33,8},{33,11},{33,23,},{33,1},{33,0}

{88,3},{88,5},{88,6},{88,8},{88,11},{88,23,},{88,1},{88,0}

{3,5},{3,6},{3,8},{3,11},{3,23,},{3,1},{3,0}

{5,6},{5,8},{5,11},{5,23,},{5,1},{5,0}

{6,8},{6,11},{6,23,},{6,1},{6,0}

{8,11},{8,23,},{8,1},{8,0}

{11,23,},{11,1},{11,0}

{23,1},{23,0}

{1,0}

TOTAL NUMBER OF PAIRS=45

INVERSIONS= 29

ORDERED PAIRS= 16

Sorted-ness:

A is most sorted as it has less inversions and more ordered pairs, after A,B is more sorted than C

A>B>C

Unsorted-ness:

C is most unsorted because it has more inversion pairs than A and B, after C, B is more unsorted than A

C>B>A