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Radix Sort in Python

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Code

Unit Test

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```

1  #=====
2  # Author: Isai Damier
3  # Title: Radix Sort
4  # Project: geekviewpoint
5  # Package: algorithms
6  #
7  # Statement:
8  # Given a disordered list of integers, rearrange them in natural order.
9  #
10 # Sample Input: [18,5,100,3,1,19,6,0,7,4,2]
11 #
12 # Sample Output: [0,1,2,3,4,5,6,7,18,19,100]
13 #
14 # Time Complexity of Solution:
15 # Best Case O(kn); Average Case O(kn); Worst Case O(kn),
16 # where k is the length of the longest number and n is the
17 # size of the input array.
18 #
19 # Note: if k is greater than log(n) then an nlog(n) algorithm would
20 # be a better fit. In reality we can always change the radix
21 # to make k less than log(n).
22 #
23 # Approach:
24 # radix sort, like counting sort and bucket sort, is an integer based
25 # algorithm (i.e. the values of the input array are assumed to be
26 # integers). Hence radix sort is among the fastest sorting algorithms
27 # around, in theory. The particular distinction for radix sort is
28 # that it creates a bucket for each cipher (i.e. digit); as such,
29 # similar to bucket sort, each bucket in radix sort must be a
30 # growable list that may admit different keys.
31 #
32 # For decimal values, the number of buckets is 10, as the decimal
33 # system has 10 numerals/cyphers (i.e. 0,1,2,3,4,5,6,7,8,9). Then
34 # the keys are continuously sorted by significant digits.
35 #=====
36 def radixsort( aList ):
37     RADIX = 10
38     maxLength = False
39     tmp , placement = -1, 1
40
41     while not maxLength:
42         maxLength = True
43         # declare and initialize buckets
44         buckets = [list() for _ in range( RADIX )]
45
46         # split aList between lists
47         for i in aList:
48             tmp = i / placement
49             buckets[tmp % RADIX].append( i )
50             if maxLength and tmp > 0:
51                 maxLength = False
52
53         # empty lists into aList array
54         a = 0
55         for b in range( RADIX ):
56             buck = buckets[b]
57             for i in buck:
58                 aList[a] = i
59                 a += 1
60
61         # move to next digit
62         placement *= RADIX

```

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10/18/2017

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