Quicksort Algorithm

I learned the concept of this sorting algorithm few days ago. I’ve decided to implement it without looking at the actual implementation.

The recursion took me a few days to implement since I had a hard time to think about how to recur code until a condition has been fulfilled. It turns out that I just have to nest the functions together and surround them with proper conditions to execute.

Although my code could work sometimes, it means that there is still something wrong with the recursion. Especially for the right recursion function calls.

Case 1

Here are the samples of successful recursion and failed ones (green and red respectively):

Sample #1

[ 67, 23, 92, 18, 17, 83, 90, 94, 62, 86,  ] - initial

[ 17, 18, 23, 62, 83, 67, 86, 94, 92, 90,  ]

Sample # 2

[ 20, 40, 62, 6, 41, 47, 70, 76, 44, 60,  ] - initial

[ 6, 40, 20, 41, 44, 47, 60, 76, 62, 70,  ]

Sample #3

[ 57, 57, 59, 83, 12, 23, 54, 60, 59, 36, ] – initial

Pivot value is 59----

[ 12, 23, 36, 54, 57, 57, 59, 59, 60, 83, ]

Sample # 4

[ 4, 15, 19, 36, 94, 70, 55, 91, 21, 18, ] – initial

[ 4, 15, 18, 19, 21, 55, 70, 91, 94, 36, ]

I’m thinking of working out this samples based on the algorithmic concept tree I made in the xmind file so that I am able to follow through based on the code I wrote…

Some lists of flaws I’ve seen while deducting those samples:

When I look at Sample #3

[12, 23, 36, 83, 57, 57, 54, 60, 59, 59]

[23, 12, 36.. // quicksort left function () completed

[12, 23, 36.. // quicksort right function () completed

I just realised that there was something wrong with my code:

Wrong sectors of my algorithm

Partitioning Function():

while(j < lastPivot) {

**if**(j == lastPivot -1 ) {

QuicksortR\_L Function():

**if**(side == 'R') {

end = end - 1;

mainPointer = mainPointer + 1;

}**else** **if**(side == 'L') {

end = end - 1;

By ‘end’ variable I mean the pivot obtained from the previous function (Sorry for bad naming, I will habitually fix my incorrectness in the future XD)

To put it simply, when the previous pivot has been obtained, the **end variable** is subtracted by one in the quicksort function() and again in the partitioning function().

Which means, instead of

[12, 23, 36..

| new pivot

| previous pivot

I have this:

[12, 23, 36…

| new pivot

| previous pivot

That is the reason why when

[23, 12, 36..

| pivot returned from the partitioning function and then passed to quicksort right()

| previous pivot (prevEnd)

The quicksort right runs and thus, giving me a sorted array:

[12, 23, 36..

When actually, it can be solved if I correct the subtraction in the partitioning function and make necessary changes.. thus **solving the right problems and making things efficient**

Case 2

After clearing the first case, I made a comparison of the right sorting function() between two sorting algorithms…

The only difference they have is the:

Quicksort:

**if**(pivot + 1 - prevPivot - 1 > 1) {

QuicksortMus:

**if**(prevEnd - (end + 1) > 1) {

Samples:

Quicksort:

[ 12, 23, 36, 54, 57, 57, 59, 60, 83, 59, ]

QuicksortMus:

[ 12, 23, 36, 54, 57, 57, 59, 59, 60, 83, ]

Perhaps the problem with quicksort right is that if we were to include the subtracted pivot in the parameters of the quicksort function, then it will ignore the last element of the array. Which, I guess, I have to modify the left quick sort algorithm and the partitioning algorithm in order t accommodate the right quicksort function changes…

[ 12, 23, 36, 57, 57, 54, 59, 60, 83, 59, ]

I made the arrangement more worse than before. But I realised something. The last element was ignored because it was mistaken as a previous pivot, rather than an element that needs to be partitioned.

Case 3:

QuicksortMus:

[ 12, 23, 36, 54, 57, 57, 59, 59, 60, 83, ]

Quicksort:

[ 12, 23, 36, 54, 57, 57, 59, 60, 59, 83, ]

Again there is something wrong with the recursion of the major right. Let us examine the problem again..

60, 59, 83, ]

Problem with this code.

Partition runs i++; thus 60 swaps itself.

Partition again runs i++; thus 59 swaps itself

Partition then runs i++; again to swap the pivot to it’s location again

Thus, 83 stays there