Assignment

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Course : Computer Algorithm

For the understanding of quick sort algorithm, first we need to know the Pivot.
So, quick sort pivot algorithm is as follows :

Step 1 : Choose the highest index value as pivot.

Step 2 : Assign two variables to point left and right of the list.

Step 3 : Leftmost variable points to lower index.

Step 4 : Rightmost variable points to higher index.

Step 5 : While value at left is less than pivot then move right.

Step 6 : While value at right is greater than pivot then move left.

Step 7 : If both steps 5 & 6 does not match, swap left & right.

Step 8 : If left ≥ right, the point where they met is new pivot.

quick sort Algorithm :-

When we use the pivot algorithm recursively, we get some smaller partitions. In the end, each partition is then processed for quick sort.

Step 1 : Assign the rightmost index value as pivot.
Step 2 : Partition the array using pivot value.
Step 3 : Quicksort left partition recursively
Step 4 : Quicksort right partition recursively.

QUICKSORT (array A, start, end)
{

1. if (start < end)
2. {
3. p = partition (A, start, end)
4. QUICKSORT(A, start, p-1)
5. QUICKSORT(A, p+1, end)
6. }
}

PARTITION (array A, start, end)
{

1. pivot ? A [end]
2. i ? start - 1
3. for j ? start to end - 1 {
4. do if (A[j] < pivot) {
5. then i ? i+1
6. swap A [i] with A[j]
7. } }
8. swap A [i+1] with A [end]
9. return i+1
}

Complexity of quick-sort :

- Time Complexity

Best Case complexity :-
    The best case in quick-sort is when pivot element is the middle element or near to the middle element. So, time complexity for this case is $O(n*\log n)$

Average case Complexity :-
    It occurs when the array elements are in jumbled order. The average case time complexity of quick sort is $O(n*\log n)$

Worst case complexity :-
    It occurs when pivot is the either the smallest or the greatest element in the list. Time complexity for the worst case is $O(n^2)$.

- Space complexity :
    The space complexity of quicksort is $O(n*\log n)$.