

In the first algorithm (both the recursive and non-recursive) the time complexity is  $O(n^2)$  while in the second algorithm the time complexity is  $O(n)$  that's because

the first algorithm uses two nested loops or loop inside recursion .

the outer loop iterates through each index  $i$  in string  $S$  which is  $O(n)$  iterations.

the inner loop iterates from index  $i$  to the end of  $S$ , which can also add  $O(n)$  iterations in the worst case.

so the first algorithm is  $O(n^2)$

in the second algorithm the algorithm uses a single loop iterates over string  $S$ , making it  $O(n)$