

33. Search in Rotated Sorted Array

There is an integer array `nums` sorted in ascending order (with **distinct** values).

Prior to being passed to your function, `nums` is **rotated** at an unknown pivot index `k` ($0 \leq k < \text{nums.length}$) such that the resulting array is `[nums[k], nums[k+1], ..., nums[n-1], nums[0], nums[1], ..., nums[k-1]]` (**0-indexed**). For example, `[0,1,2,4,5,6,7]` might be rotated at pivot index `3` and become `[4,5,6,7,0,1,2]`.

Given the array `nums` **after** the rotation and an integer `target`, return *the index of `target` if it is in `nums`, or `-1` if it is not in `nums`*.

You must write an algorithm with $O(\log n)$ runtime complexity.

Example 1:

Input: `nums = [4,5,6,7,0,1,2]`, `target = 0`

Output: `4`

Example 2:

Input: `nums = [4,5,6,7,0,1,2]`, `target = 3`

Output: `-1`

Example 3:

Input: `nums = [1]`, `target = 0`

Output: `-1`

```
def search(self, nums: List[int], target: int) -> int:
    if len(nums)==1:
        if nums[0]==target:
            return 0
        else:
            return -1
    minIdx = self.searchMin(nums)
    # print(minIdx)
    if nums[minIdx]==target:
        return minIdx
    if minIdx==0:
        return self.binarySearch(nums,0,len(nums)-1,target)
    left=self.binarySearch(nums,0,minIdx-1,target)
```

```

right=self.binarySearch(nums,minIdx,len(nums)-1,target)
# print(left,right)
if left==-1 and right==-1:
    return -1
else:
    return left if right==-1 else right

def binarySearch(self,arr,low,high,target):
    if low==high and arr[low]==target:
        return low
    while low<=high:
        mid = low+(high-low)//2
        if arr[mid]==target:
            return mid
        elif arr[mid]>target:
            high = mid-1
        elif arr[mid]<target:
            low = mid+1
    return -1

def searchMin(self,arr):
    start = 0
    end = len(arr)-1
    n = len(arr)

    while start <= end:
        if arr[start]<arr[end]:
            return start
        mid = start + (end - start) // 2
        prev = (mid+n-1)%n
        nextt = (mid+1)%n
        if arr[mid] < arr[nextt] and arr[mid] < arr[prev]:
            return mid
        elif arr[mid] <= arr[end]:
            end = mid - 1
        elif arr[mid] >= arr[start]:
            start = mid + 1

```