

Finding the Median of Two Sorted Arrays

Problem Statement

Given two sorted arrays `nums1` and `nums2` of size `m` and `n` respectively, we want to return the median of the two sorted arrays.

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Median

The median is a statistical measure that determines the middle value of a sorted list of numbers. In other words, it separates the higher half from the lower half of the data set. If the data set has an odd number of observations, the number in the middle is the median. For a data set with an even number of observations, the median is the average of the two middle numbers.

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Binary Search

Binary search is an efficient algorithm for finding an item from a sorted list of items. It works by repeatedly dividing in half the portion of the list that could contain the item until you've narrowed down the possible locations to just one.

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Python Code

```
def find_median_sorted_arrays(nums1, nums2):  
    if len(nums1) > len(nums2):  
        nums1, nums2 = nums2, nums1  
  
    x, y = len(nums1), len(nums2)  
  
    start = 0  
    end = x  
  
    while start <= end:  
        partition_x = (start + end) // 2  
        partition_y = (x + y + 1) // 2 - partition_x  
  
        max_of_left_x = nums1[partition_x - 1] if partition_x > 0 else float("-inf")  
        min_of_right_x = nums1[partition_x] if partition_x < x else float("inf")  
  
        max_of_left_y = nums2[partition_y - 1] if partition_y > 0 else float("-inf")  
        min_of_right_y = nums2[partition_y] if partition_y < y else float("inf")  
  
        if max_of_left_x <= min_of_right_y and max_of_left_y <= min_of_right_x:  
            if (x + y) % 2 == 0:  
                return max(max_of_left_x, max_of_left_y), min(min_of_right_x, min_of_right_y)  
            else:
```

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```
    return max(max_of_left_x, max_of_left_y)
```

```
elif max_of_left_x > min_of_right_y:
```

```
    end = partition_x - 1
```

```
else:
```

```
    start = partition_x + 1
```

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Testing the Code

When tested with the input arrays `nums1 = [2,5]` and `nums2 = [3,6]`, the function returns `(3, 5)`. This means that the median of the combined array is the average of 3 and 5, which is 4.