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Intuition

This code merges two sorted arrays, `nums1` and `nums2`, into `nums1`. It starts by initializing a pointer, `last`, at the end of `nums1` where the merged array will be stored. Then, it iterates through both arrays from the end towards the beginning. At each step, it compares the last elements of `nums1` and `nums2`, selects the larger one, and places it at position `last` in `nums1`. The pointer `last` and the corresponding array index are decremented accordingly. Once one of the arrays is exhausted, it simply copies the remaining elements from the other array into `nums1`. This approach optimizes space by merging the arrays in-place without using any additional memory, and it does so in linear time, proportional to the combined lengths of the input arrays.

Approach

1. Initialize a pointer `last` to the last valid index in `nums1`, which is `m + n - 1`, where `m` is the length of `nums1` (excluding the extra space for merging) and `n` is the length of `nums2`.
2. Iterate through both arrays from the end towards the beginning.
3. Compare the last elements of `nums1` and `nums2`.
    - If the last element of `nums1` is larger, copy it to `nums1[last]` and decrement `m` and `last`.
    - If the last element of `nums2` is larger or equal, copy it to `nums1[last]` and decrement `n` and `last`.
4. Continue this process until either `m` or `n` becomes 0.
5. If there are remaining elements in `nums2` (i.e., `n` is greater than 0), copy them to the beginning of `nums1`, up to index `last`, which would be 0.
6. The merged array will now be in `nums1`.

Complexity

- Time complexity: O(m+n)
- Space complexity: O(1)

Code

```python
class Solution:
    def merge(self, nums1: List[int], m: int, nums2: List[int], n: int) -> None:
        last = m + n - 1
        while m > 0 and n > 0:
            if nums1[m - 1] > nums2[n - 1]:
                nums1[last] = nums1[m - 1]
                m -= 1
            else:
                nums1[last] = nums2[n - 1]
                n -= 1
            last -= 1

        while n > 0:
            nums1[last] = nums2[n - 1]
            n, last = n - 1, last - 1
```

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