AlgoExpert | Python | 00:00:00

Prompt | Scratchpad | Solutions | Video Explanation

Difficulty: Easy **Category:** Sorting **Successful Submissions:** 41,879+

Insertion Sort

Write a function that takes in an array of integers and returns a sorted version of that array. Use the Insertion Sort algorithm to sort the array.

If you're unfamiliar with Insertion Sort, we recommend watching the Conceptual Overview section of this question's video explanation before starting to code.

Sample Input

```
array = [8, 5, 2, 9, 5, 6, 3]
```

Sample Output

```
[2, 3, 5, 5, 6, 8, 9]
```

Hints

Hint 1

Divide the input array into two subarrays in place. The first subarray should be sorted at all times and should start with a length of 1, while the second subarray should be unsorted. Iterate through the unsorted subarray, inserting all of its elements into the sorted subarray in the correct position by swapping them into place. Eventually, the entire array will be sorted.

Optimal Space & Time Complexity

Best: O(n) time | O(1) space - where n is the length of the input array Average: O(n^2) time | O(1) space - where n is the length of the input array Worst: O(n^2) time | O(1) space - where n is the length of the input array

Your Solutions | Run Code

Solution 1 | Solution 2 | Solution 3

```python
def insertionSort(array, reverse=False):
    # Algorithm

    # Virtually split the array into two parts, sorted and unsorted
    # Pick the first element from the unsorted part
    # Place this element at the correct position in the sorted part (inserting into sorted part, this is where the name came from
    # Perform the above two operations until all the elements from the unsorted part are brought into the sorted part

    '''
    O(n**2) Time | O(1) Space: where n is the length of the input array
    '''
    for idx1 in range(1, len(array)):
        for idx2 in reversed(range(idx1)):
            if reverse:
                if array[idx1] > array[idx2]:
                    array[idx1], array[idx2] = array[idx2], array[idx1]
                    idx1 -= 1
                else:
                    break
            else:
                if array[idx1] < array[idx2]:
                    array[idx1], array[idx2] = array[idx2], array[idx1]
                    idx1 -= 1
                else:
                    break
    return array

# Kunal Wadhwa

# https://github.com/kunal5042
# https://leetcode.com/kunal5042/
# https://www.hackerrank.com/kunalwadhwa_cs
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```

Custom Output | Raw Output | Submit Code

Yay, your code passed all the test cases!

19 / 19 test cases passed.

- Test Case 1 passed!
- Test Case 2 passed!
- Test Case 3 passed!
- Test Case 4 passed!
- Test Case 5 passed!
- Test Case 6 passed!
- Test Case 7 passed!
- Test Case 8 passed!
- Test Case 9 passed!
- Test Case 10 passed!
- Test Case 11 passed!
- Test Case 12 passed!
- Test Case 13 passed!
- Test Case 14 passed!
- Test Case 15 passed!
- Test Case 16 passed!
- Test Case 17 passed!
- Test Case 18 passed!