Exp-2.5

Title:

Find the kth missing positive integer from a strictly increasing integer array.

Aim:

To design and implement a Python program to find the kth positive integer missing from the given sorted array of positive integers.

Procedure:

1. Read the input array arr (sorted in strictly increasing order) and integer k.
2. Iterate through positive integers starting from 1, maintaining a pointer for the array.
3. For each positive integer, check if it matches the current element in arr:
    - If yes, move to next array element.
    - If no, decrement k as the number is missing.
4. Continue until k reaches zero; the number at this point is the kth missing positive.
5. Print the kth missing positive integer.

Algorithm:

1. Initialize missing_count = 0, num = 1, index = 0.
2. While missing_count < k:
    - If index < len(arr) and arr[index] == num, increment both num and index.
    - Else, increment missing_count and num.
3. When missing_count == k, return num - 1 as kth missing number.
4. End.

Input:

```
5
2 3 4 7 11
5
4
1 2 3 4
2
```

Output:

```
9
6
```

Program:

```
def findKthPositive(arr, k):
    missing_count = 0
    num = 1
    index = 0
    n = len(arr)
    while missing_count < k:
        if index < n and arr[index] == num:
            index += 1
        else:
            missing_count += 1
        num += 1
    return num - 1
n = int(input("Enter size of the array: "))
arr = list(map(int, input(f"Enter {n} strictly increasing positive integers: ").split()))
k = int(input("Enter k: "))
```

result = findKthPositive(arr, k)

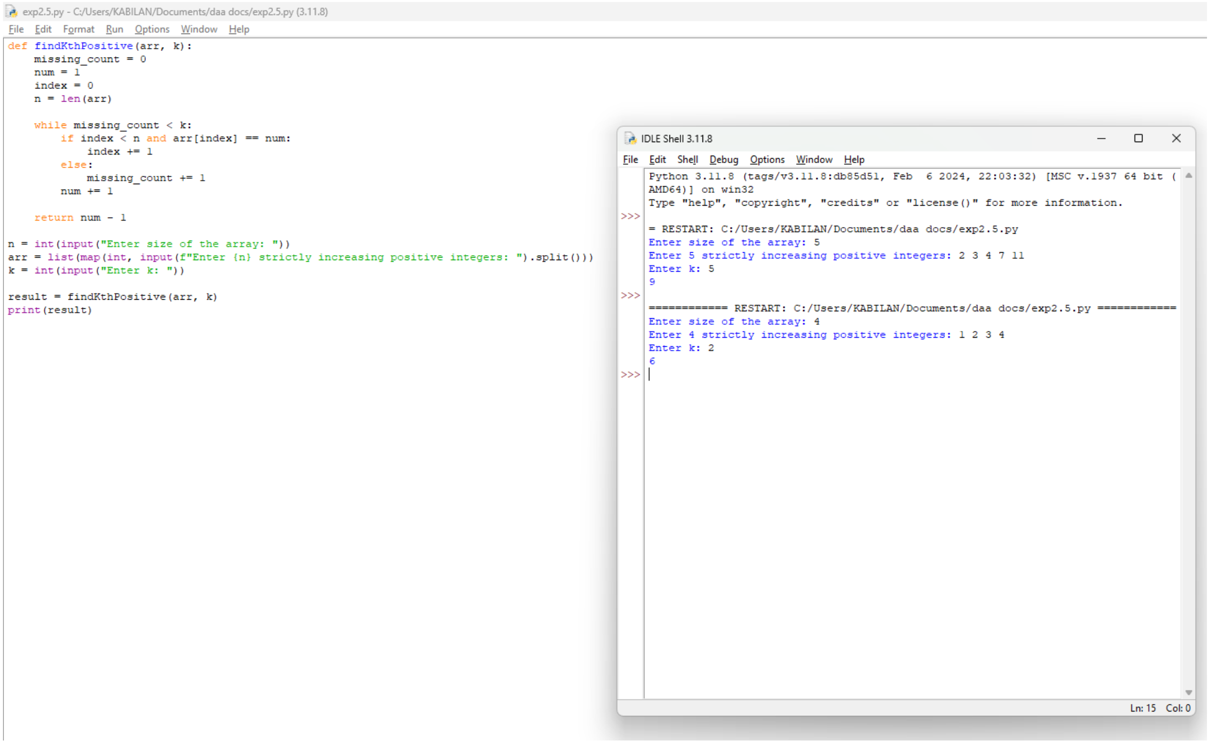
print(result)

Performance Analysis:

Time Complexity: O(n + k)

Space Complexity: O(1)

Program Output:



exp2.5.py - C:/Users/KABILAN/Documents/daa docs/exp2.5.py (3.11.8)
File Edit Format Run Options Window Help

```python
def findKthPositive(arr, k):
    missing_count = 0
    num = 1
    index = 0
    n = len(arr)

    while missing_count < k:
        if index < n and arr[index] == num:
            index += 1
        else:
            missing_count += 1
        num += 1

    return num - 1

n = int(input("Enter size of the array: "))
arr = list(map(int, input(f"Enter {n} strictly increasing positive integers: ").split()))
k = int(input("Enter k: "))

result = findKthPositive(arr, k)
print(result)
```

IDLE Shell 3.11.8
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Ln: 15 Col: 0

```
Python 3.11.8 (tags/v3.11.8:db85d51, Feb  6 2024, 22:03:32) [MSC v.1937 64 bit (
AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/KABILAN/Documents/daa docs/exp2.5.py
Enter size of the array: 5
Enter 5 strictly increasing positive integers: 2 3 4 7 11
Enter k: 5
9
>>>
============ RESTART: C:/Users/KABILAN/Documents/daa docs/exp2.5.py ============
Enter size of the array: 4
Enter 4 strictly increasing positive integers: 1 2 3 4
Enter k: 2
6
>>>
```

Result:

Thus the given program Find kth Missing Positive is executed and got output successfully.