

2185. Counting Words With a Given Prefix

Easy Array String

Problem Description

The task is to count how many strings from the given array `words` have the string `pref` as their prefix. A prefix is defined as a substring that appears at the start of another string. For example, if `pref` is "ab", and you have a string "abcd" in `words`, it counts because "abcd" starts with "ab".

Intuition

The intuitive solution to this problem is straightforward. You simply iterate through each string in the array `words` and check if it starts with the string `pref`. The method `startswith()` in Python is perfect for this task as it does exactly what's needed—it returns `True` if the string object it's called on starts with the specified prefix, which in this case, is `pref`.

Solution Approach

The solution is implemented in Python and makes use of a list comprehension and the built-in `startswith()` method for strings. The elegance of the solution lies in its simplicity and efficient use of the language's features.

Here are the steps taken in the algorithm:

- Loop through each string `w` in the array `words` using a list comprehension. For each string, check if it starts with the prefix `pref`. This is done using the `startswith()` method, which is called on each `w`.
- The `startswith()` method returns a boolean value `True` or `False`. This list comprehension creates a list of boolean values corresponding to each string in `words`.
- The `sum()` function is then used to add up all the boolean values in the list. In Python, `True` is treated as `1` and `False` as `0` when summed. So, `sum()` essentially counts all the `True` values, which represent the strings that start with `pref`.
- The result of the `sum()` function gives us the total number of strings in `words` that contain `pref` as a prefix.

The code for this solution is concise and can be written as:

```
class Solution:
    def prefixCount(self, words: List[str], pref: str) -> int:
        return sum(w.startswith(pref) for w in words)
```

This code fragment is the complete implementation of the solution. It defines a class `Solution` with a method `prefixCount`, which takes an array of strings `words` and a string `pref` as arguments and returns an integer. The `prefixCount` method only contains the above-mentioned list comprehension wrapped in the `sum()` function, which calculates and returns the count directly.

The solution does not require additional data structures and is a good example of Python's expressive capability to solve problems in a very readable and succinct manner.

Example Walkthrough

Let's illustrate the solution with a small example. Suppose we have an array of strings `words` that contains `["apple", "appreciate", "appetite", "banana", "application"]` and our prefix `pref` is "app".

As we iterate through `words`:

- The first word "apple" starts with "app". `startswith()` returns `True`.
- The second word "appreciate" also starts with "app". `startswith()` returns `True`.
- The third word "appetite" starts with "app" as well. `startswith()` returns `True`.
- The fourth word "banana" does not start with "app". `startswith()` returns `False`.
- The fifth word "application" starts with "app". `startswith()` returns `True`.

Using the list comprehension `[w.startswith(pref) for w in words]`, we get a list of boolean values: `[True, True, True, False, True]`.

Passing this list to the `sum()` function adds up the `True` values (with each `True` being equivalent to `1`): `sum([True, True, True, False, True])` which equals `1 + 1 + 1 + 0 + 1`, giving us a total of `4`.

So, the total count of strings with the prefix "app" in the `words` array is `4`. This demonstrates the simplicity and elegance of the solution using Python's built-in functions.

Solution Implementation

Python

```
from typing import List # Import List from typing module for type annotation

class Solution:
    def prefixCount(self, words: List[str], pref: str) -> int:
        # Count the number of words that start with the given prefix
        # Args:
        #     words: A list of strings representing the words
        #     pref: A string representing the prefix to be matched
        # Returns:
        #     The count of words starting with the given prefix

        # Use a generator expression to iterate over 'words' list
        # The 'startswith()' method is used to check if the word starts with 'pref'
        # 'sum()' function adds up how many times True appears (i.e., where the condition is met)
        return sum(word.startswith(pref) for word in words)
```

Java

```
class Solution {
    // Method to count how many strings in the words array have the prefix 'pref'
    public int prefixCount(String[] words, String pref) {
        int count = 0; // Initialize a variable to store the count of words with the prefix
        // Iterate through each word in the array
        for (String word : words) {
            // Check if the current word starts with the given prefix
            if (word.startsWith(pref)) {
                // Increment the count if the word has the prefix
                count++;
            }
        }
        // Return the total count of words with the prefix
        return count;
    }
}
```

C++

```
#include <vector>
#include <string>

class Solution {
public:
    // Function to count the number of words in 'words' that start with the given prefix 'pref'
    int prefixCount(vector<string>& words, const string& pref) {
        int count = 0; // Initialize a variable to store the count of words with the given prefix
        for (const auto& word : words) { // Iterate over each word in the vector 'words'
            if (word.find(pref) == 0) { // Check if 'pref' is a prefix of 'word'
                count++; // Increment the count if the word starts with the given prefix
            }
        }
        return count; // Return the total count of words with the given prefix
    }
};
```

TypeScript

```
// Counts the number of words in the array that start with the given prefix.
// @param words - An array of strings to be checked against the prefix.
// @param prefix - The prefix string to match at the beginning of each word.
// @returns The count of words starting with the specified prefix.
function prefixCount(words: string[], prefix: string): number {
    // Use Array.prototype.reduce to accumulate the count of words starting with the prefix.
    // - The callback function checks if the current word starts with the prefix.
    // - If it does, increment the accumulator.
    // - The initial value of the accumulator is set to 0.
    return words.reduce((accumulator, currentWord) => (
        accumulator += currentWord.startsWith(prefix) ? 1 : 0
    ), 0);
}
```

```
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class Solution:
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        # Args:
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        # Use a generator expression to iterate over 'words' list
        # The 'startswith()' method is used to check if the word starts with 'pref'
        # 'sum()' function adds up how many times True appears (i.e., where the condition is met)
        return sum(word.startswith(pref) for word in words)
```

Time and Space Complexity

The given Python function `prefixCount` iterates over each word in the list `words` and checks if it starts with the prefix `pref` using the `startswith` method. The computation complexity analysis is as follows:

Time Complexity

The time complexity of the function is $O(n * k)$, where `n` is the number of words in the list and `k` is the length of the prefix `pref`. This is because for each of the `n` words, the `startswith` method checks up to `k` characters to determine if the word starts with the prefix.

Space Complexity

The space complexity of the function is $O(1)$. The function uses a generator expression within the `sum` function, which calculates the result on-the-fly and does not require additional space proportional to the input size. The only additional memory used is for the counter in the `sum` function, which is a constant space requirement.