

ASSIGNMENT:2.2

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BATCH-30

TASK-1

PROMPT: generate a function that filters out all negative numbers from a list .(first generate list)

CODE:

The screenshot shows a Google Colab notebook titled "Untitled8.ipynb". The code cell contains the following Python script:

```
import random

# Generates a list of 10 random integers, including positive, negative, and zero
numbers = [random.randint(-10, 10) for _ in range(10)]
print("Original list:", numbers)

def filter_negative_numbers(input_list):
    """
    Filters out all negative numbers from a given list.

    Args:
        input_list (list): The list of numbers to filter.

    Returns:
        list: A new list containing only non-negative numbers.
    """
    return [num for num in input_list if num >= 0]

# Apply the function to the generated list
filtered_numbers = filter_negative_numbers(numbers)
print("Filtered list (non-negative numbers only):", filtered_numbers)

def count_chars(input_string):
    """
    Counts the number of vowels, consonants, and digits in a given string.

    Args:
        input_string (str): The string to analyze.

    Returns:
        dict: A dictionary containing the counts of 'vowels', 'consonants', and 'digits'.
    """
    vowels = "aeiouAEIOU"
    count = {"vowels": 0, "consonants": 0, "digits": 0}
    for char in input_string:
        if char in vowels:
            count["vowels"] += 1
        elif char.isalpha():
            count["consonants"] += 1
        elif char.isdigit():
            count["digits"] += 1
    return count
```

OBSERVATION:

The program uses Python random module to generate a list of ten integers ranging from minus ten to ten so the list may contain negative numbers zero and positive numbers The original list is printed first showing all randomly generated values A function named filter-negative-numbers is defined to remove negative numbers from the list

Inside the function list comprehension is used with the condition num greater than or equal to zero which keeps only zero and positive values The function does not modify the original list instead it returns a new filtered list The filtered list output contains only non-negative numbers proving that the filtering logic works correctly

TASK-2

PROMPT: generate a Python function that counts vowels, consonants, and digits in a string

CODE:

The screenshot shows a Google Colab interface with a code cell containing the following Python code:

```
def count_chars(input_string):
    """
    Counts the number of vowels, consonants, and digits in a given string.

    Args:
        input_string (str): The string to analyze.

    Returns:
        dict: A dictionary containing the counts of 'vowels', 'consonants', and 'digits'.
    """
    vowels = "aeiouAEIOU"
    vowel_count = 0
    consonant_count = 0
    digit_count = 0

    for char in input_string:
        if char.isalpha(): # Check if the character is an alphabet
            if char in vowels:
                vowel_count += 1
            else:
                consonant_count += 1
        elif char.isdigit(): # Check if the character is a digit
            digit_count += 1

    return {
        "vowels": vowel_count,
        "consonants": consonant_count,
        "digits": digit_count
    }

# Example usage:
my_string = "Hello World 123!"
counts = count_chars(my_string)
print(f"The string '{my_string}' contains:")
print(f"Vowels: {counts['vowels']}")
print(f"Consonants: {counts['consonants']}")
print(f"Digits: {counts['digits']}")
```

The code defines a function `count_chars` that takes a string as input and returns a dictionary with the counts of vowels, consonants, and digits. It uses a loop to iterate through each character in the string, checks if it's an alphabet using `isalpha()`, and then checks if it's a vowel or consonant. If it's a digit, it increments the digit count. Finally, it prints the counts for the example string "Hello World 123!".

OBSERVATION:

The program defines a function named `count_chars` that analyzes a given string. It checks each character in the string one by one using a loop.

If the character is an alphabet it further checks whether it is a vowel or a consonant. Vowels are identified using a predefined string containing both uppercase and lowercase vowels. If the character is a digit it increases the digit count. Special characters spaces and symbols are ignored. The function keeps separate counters for vowels, consonants, and digits. It returns the final counts in the form of a dictionary. The example string "Hello World 123!" is passed to the function. The output correctly displays the number of vowels, consonants, and digits present in the string.

TASK-3

PROMPT: Generate a palindrome-checking function and compare the results.

CODE:

The screenshot shows a Google Colab interface with two code cells. The first cell contains a script that prints character counts and then defines a function to check if a string is a palindrome. The second cell runs the function on several test cases, including sentences and words.

```
# [4]
print("Consonants: " + str(counts['consonants']))
print("Digits: " + str(counts['digits']))

... The string 'Hello World 123!' contains:
Vowels: 3
Consonants: 7
Digits: 3

# [5]
def is_palindrome(text):
    """
    Checks if a given string is a palindrome.

    A palindrome is a word, phrase, number, or other sequence of characters
    which reads the same backward as forward, ignoring spaces, punctuation,
    and case.

    Args:
        text (str): The string to check.

    Returns:
        bool: True if the string is a palindrome, False otherwise.
    """
    # Remove non-alphanumeric characters and convert to lowercase
    processed_text = ''.join(char.lower() for char in text if char.isalnum())

    # Compare the processed string with its reverse
    return processed_text == processed_text[::-1]

# Test cases
print("Palindrome checker results:")
print("'madam' is a palindrome: " + str(is_palindrome("madam")))
print("'A man, a plan, a canal: Panama' is a palindrome: " + str(is_palindrome("A man, a plan, a canal: Panama")))
print("'racecar' is a palindrome: " + str(is_palindrome("racecar")))
print("'hello' is a palindrome: " + str(is_palindrome("hello")))
print("'Python' is a palindrome: " + str(is_palindrome("Python")))
print("'No lemon, no melon' is a palindrome: " + str(is_palindrome("No lemon, no melon")))

... Palindrome checker results:
'madam' is a palindrome: True
'A man, a plan, a canal: Panama' is a palindrome: True
'racecar' is a palindrome: True
'hello' is a palindrome: False
'Python' is a palindrome: False
'No lemon, no melon' is a palindrome: True
```

OBSERVATION:

The program defines a function named `is_palindrome` that checks whether a given string is a palindrome. It first removes all non-alphanumeric characters such as spaces, punctuation, and symbols. All remaining characters are converted to lowercase to ensure case insensitive comparison. The cleaned string is then compared with its reverse using slicing. If both strings are the same, the function returns true; otherwise, it returns false. This approach allows phrases and sentences to be checked correctly, not just single words.

TASK-4

PROMPT: explain a Python function (prime check OR palindrome check) line by line.

CODE:

The screenshot shows a Jupyter Notebook interface in Google Colab. The notebook cell contains the following Python code:

```
def is_palindrome(text):
```

Gemini provides a detailed explanation of this code:

- It defines a Python function named `is_palindrome` that accepts a single argument, `text`, which is expected to be a string.
- The function uses a docstring to explain its purpose: "Checks if a given string is a palindrome, ignoring case and non-alphanumeric characters."
- It lists the arguments: `text (str): The string to check.`
- It lists the return value: `Returns: bool: True if the string is a palindrome, False otherwise.`
- It notes that this is a docstring, which serves as internal documentation for the function.
- It explains the pre-processing step: "This line performs pre-processing on the input string: for char in text: if char.isalnum(): processed_text = ''.join(char.lower() for char in text if char.isalnum())".
- It highlights the use of `join` and `lower` methods.
- It provides links for further exploration: "Explain a prime check function line by line", "Test the is_palindrome function with a custom input", and "Explain the count_chars function in detail".
- A sidebar asks, "What can I help you build?" with a plus sign icon.
- The bottom right corner shows "Gemini 2.5 Flash" and the timestamp "13:46".

OBSERVATION:

Explanation:

`def is_palindrome(text):`

This line defines a function named `is_palindrome` that takes one argument: `text` (which is expected to be a string).

"""\n..."""\n

This is a docstring, which provides a brief description of what the function does, its arguments (Args), and what it returns (Returns). It's good practice for documenting code.

`processed_text = ".join(char.lower() for char in text if char.isalnum())`

This is the core of the pre-processing step:

`for char in text:` It iterates through each character in the input text string.

`if char.isalnum():` It checks if the character is alphanumeric (i.e., a letter or a number). This effectively filters out spaces, punctuation, and other symbols.

`char.lower():` For each alphanumeric character, it converts it to lowercase. This ensures that case doesn't affect the palindrome check (e.g., 'Racecar' should be considered a palindrome).

`".join(...):` It concatenates all the filtered and lowercased characters back into a single string. The result is stored in the `processed_text` variable.

`return processed_text == processed_text[::-1]`

This line performs the actual palindrome check and returns the result:

`processed_text[::-1]`: This creates a reversed version of the `processed_text` string using Python's slicing notation. `[::-1]` means start from the end, go to the beginning, with a step of -1.

`processed_text == processed_text[::-1]`: It compares the `processed_text` with its reversed version. If they are identical, the expression evaluates to True, indicating it's a palindrome. Otherwise, it evaluates to False.

`return`: The Boolean result (True or False) is returned by the function.