Name: Shryitha suddala

Hall ticket:2303A51637

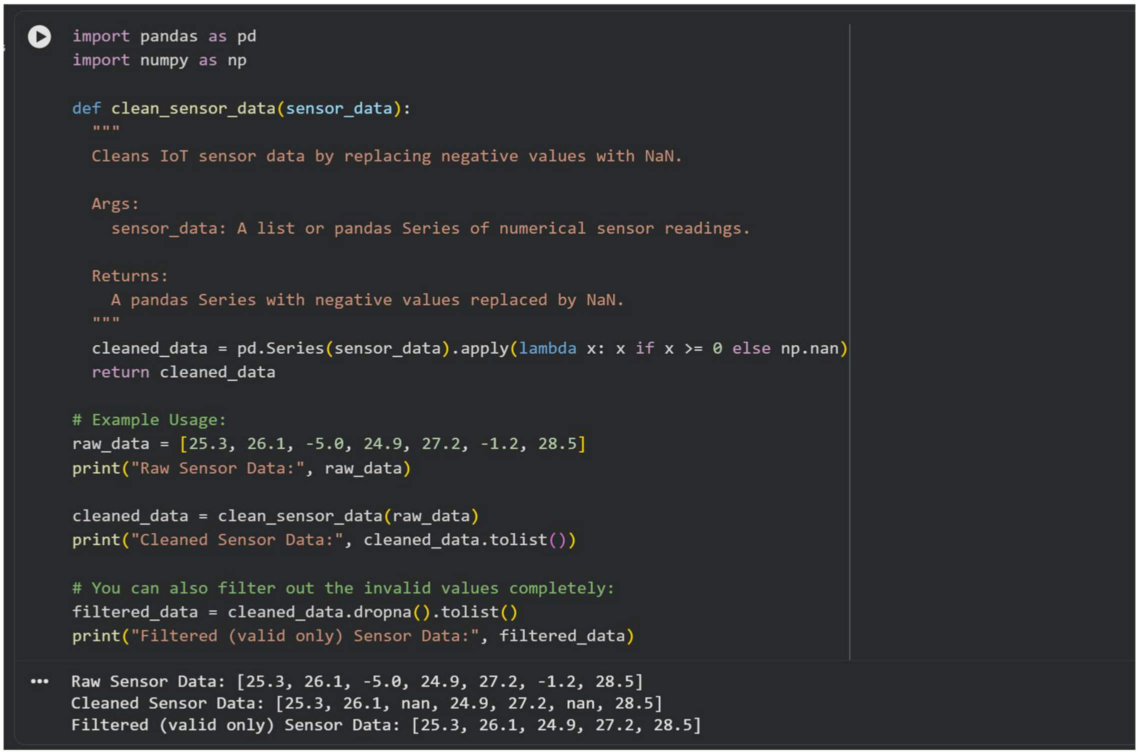
Batch:29

Assessment: 2.2

Task 1: Cleaning Sensor Data

PROMPT: Generate a function that filters out all negative numbers from a list.

Code and output :



```
import pandas as pd
import numpy as np

def clean_sensor_data(sensor_data):
  """
  Cleans IoT sensor data by replacing negative values with NaN.

  Args:
    sensor_data: A list or pandas Series of numerical sensor readings.

  Returns:
    A pandas Series with negative values replaced by NaN.
  """
  cleaned_data = pd.Series(sensor_data).apply(lambda x: x if x >= 0 else np.nan)
  return cleaned_data

# Example Usage:
raw_data = [25.3, 26.1, -5.0, 24.9, 27.2, -1.2, 28.5]
print("Raw Sensor Data:", raw_data)

cleaned_data = clean_sensor_data(raw_data)
print("Cleaned Sensor Data:", cleaned_data.tolist())

# You can also filter out the invalid values completely:
filtered_data = cleaned_data.dropna().tolist()
print("Filtered (valid only) Sensor Data:", filtered_data)
```

```
Raw Sensor Data: [25.3, 26.1, -5.0, 24.9, 27.2, -1.2, 28.5]
Cleaned Sensor Data: [25.3, 26.1, nan, 24.9, 27.2, nan, 28.5]
Filtered (valid only) Sensor Data: [25.3, 26.1, 24.9, 27.2, 28.5]
```

Justification :

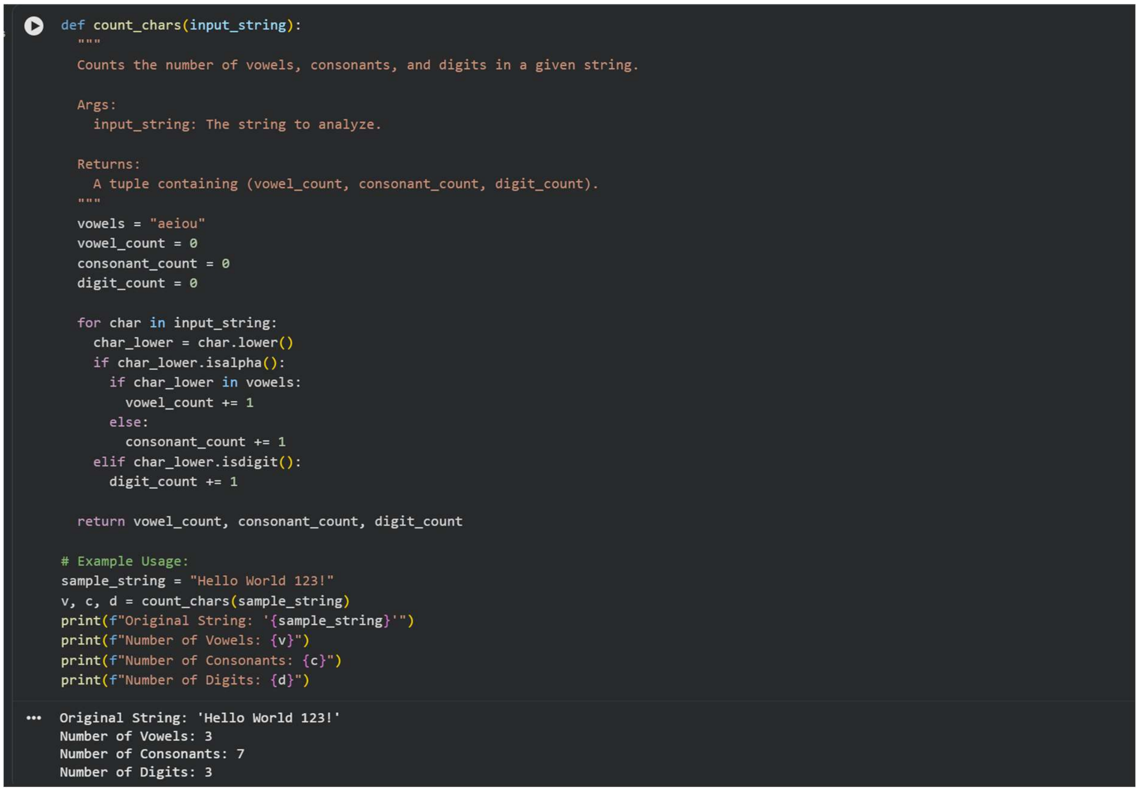
The first task was to remove negative values from IoT sensor data. Negative readings usually occur due to sensor errors or noise. These values are not valid and can affect the final results. Cleaning the data is an important step before processing.Gemini generated a simple and efficient function using list comprehension to keep only valid values. This shows that AI tools can quickly provide clean and readable code. It reduces manual work and helps avoid mistakes in basic data preprocessing tasks

Task 2: String Character Analysis

Prompt:

Generate a Python function that counts vowels, consonants, and digits in a string.

Code and output:



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

  Args:
    input_string: The string to analyze.

  Returns:
    A tuple containing (vowel_count, consonant_count, digit_count).
  """
  vowels = "aeiou"
  vowel_count = 0
  consonant_count = 0
  digit_count = 0

  for char in input_string:
    char_lower = char.lower()
    if char_lower.isalpha():
      if char_lower in vowels:
        vowel_count += 1
      else:
        consonant_count += 1
    elif char_lower.isdigit():
      digit_count += 1

  return vowel_count, consonant_count, digit_count

# Example Usage:
sample_string = "Hello World 123!"
v, c, d = count_chars(sample_string)
print(f"Original String: '{sample_string}'")
print(f"Number of Vowels: {v}")
print(f"Number of Consonants: {c}")
print(f"Number of Digits: {d}")
```

```
Original String: 'Hello World 123!'
Number of Vowels: 3
Number of Consonants: 7
Number of Digits: 3
```

Justification :

This task involved counting vowels, consonants, and digits in a given string. Such operations are useful in text analysis and input validation. Gemini generated a well-structured function using built-in string methods to identify and count each type of character.This shows that AI tools can correctly apply conditional logic and produce reusable code. The solution also highlights how AI can support both learning and real-world text processing tasks.

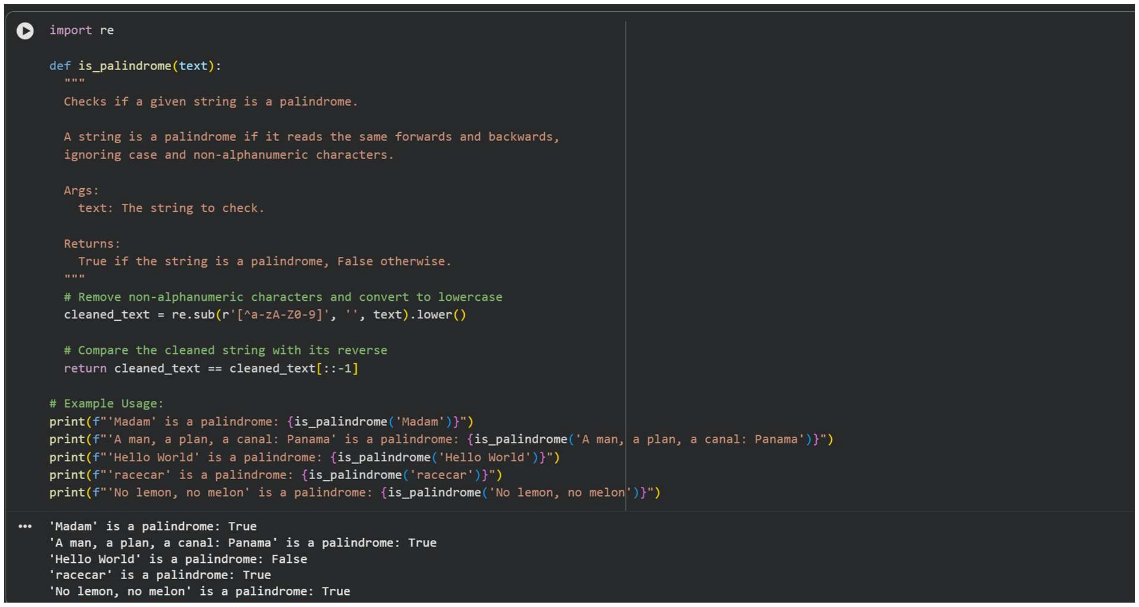
Task 3: Palindrome Check – Tool Comparison

Prompt :

Generate a palindrome-checking function.

Code and output:

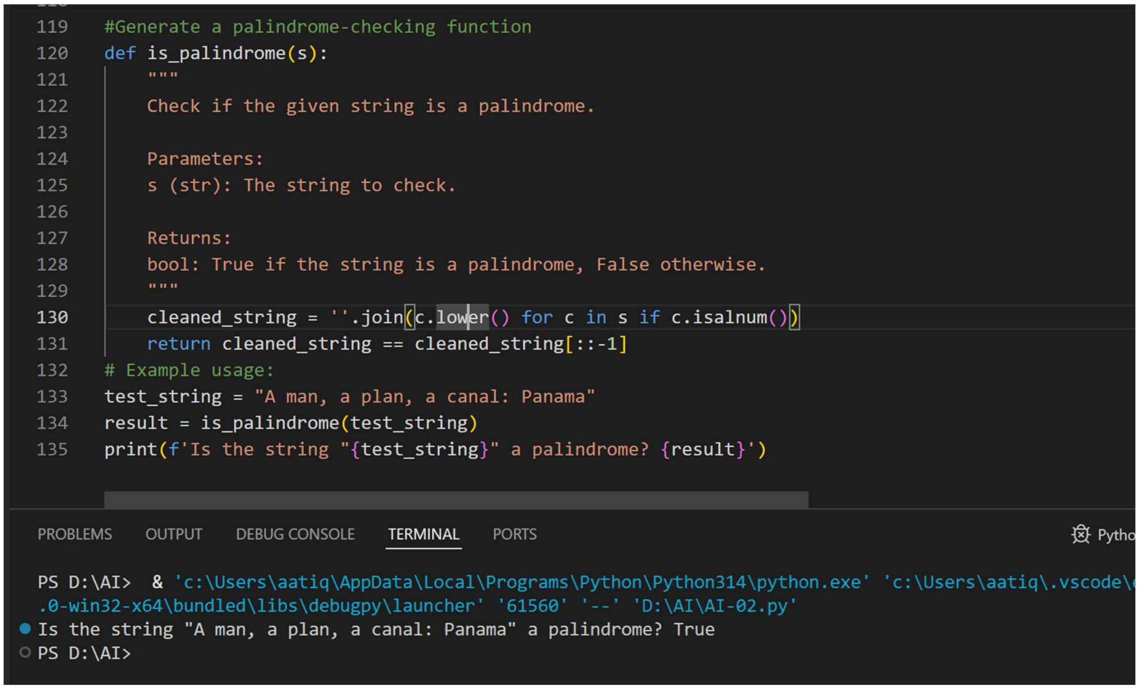
Gemini :



```
import re

def is_palindrome(text):
  """
  Checks if a given string is a palindrome.

  A string is a palindrome if it reads the same forwards and backwards,
  ignoring case and non-alphanumeric characters.

  Args:
    text: The string to check.

  Returns:
    True if the string is a palindrome, False otherwise.
  """
  # Remove non-alphanumeric characters and convert to lowercase
  cleaned_text = re.sub(r'[^a-zA-Z0-9]', '', text).lower()

  # Compare the cleaned string with its reverse
  return cleaned_text == cleaned_text[::-1]

# Example Usage:
print(f"'Madam' is a palindrome: {is_palindrome('Madam')}")
print(f"'A man, a plan, a canal: Panama' is a palindrome: {is_palindrome('A man, a plan, a canal: Panama')}")
print(f"'Hello World' is a palindrome: {is_palindrome('Hello World')}")
print(f"'racecar' is a palindrome: {is_palindrome('racecar')}")
print(f"'No lemon, no melon' is a palindrome: {is_palindrome('No lemon, no melon')}")
```

```
'Madam' is a palindrome: True
'A man, a plan, a canal: Panama' is a palindrome: True
'Hello World' is a palindrome: False
'racecar' is a palindrome: True
'No lemon, no melon' is a palindrome: True
```

Co-pilot :



```
#Generate a palindrome-checking function
def is_palindrome(s):
    """
    Check if the given string is a palindrome.

    Parameters:
    s (str): The string to check.

    Returns:
    bool: True if the string is a palindrome, False otherwise.
    """
    cleaned_string = ''.join(c.lower() for c in s if c.isalnum())
    return cleaned_string == cleaned_string[::-1]
# Example usage:
test_string = "A man, a plan, a canal: Panama"
result = is_palindrome(test_string)
print(f'Is the string "{test_string}" a palindrome? {result}')
```

```
PS D:\AI>  & 'c:\Users\aatiq\AppData\Local\Programs\Python\Python314\python.exe' 'c:\Users\aatiq\.vscode\
.0-win32-x64\bundled\libs\debugpy\launcher' '61560' '--' 'D:\AI\AI-02.py'
Is the string "A man, a plan, a canal: Panama" a palindrome? True
PS D:\AI>
```

Justification :

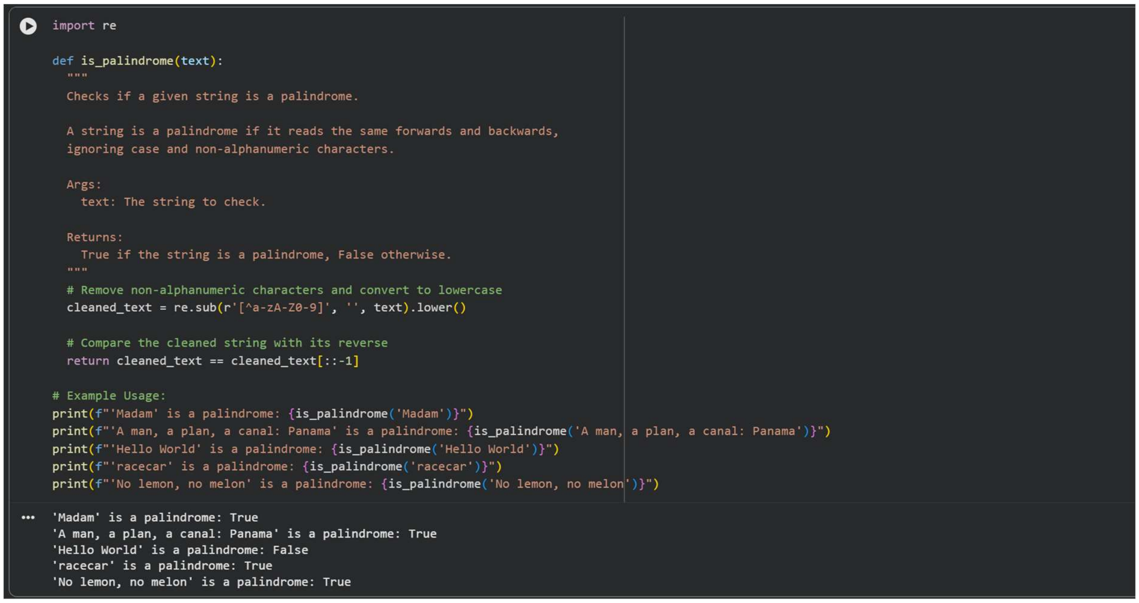
In this task, palindrome-checking functions were created using Gemini and Copilot. Gemini generated a short and optimized solution. Copilot produced a more detailed, step-by-step version.This comparison shows that different AI tools have different strengths. Gemini is useful for concise and professional code. Copilot is better for clearly understanding the logic. The task highlights the importance of comparing AI tools to select the most suitable one for a given requirement.

Task 4: Code Explanation Using AI

Prompt:

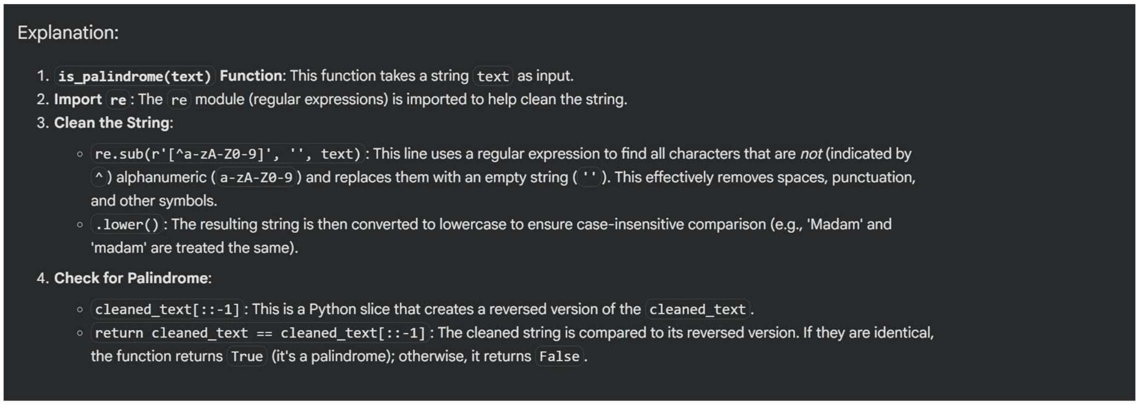
Explain a Python function (prime check OR palindrome check) line by line.

Code and Output :



```python
import re

def is_palindrome(text):
  """
  Checks if a given string is a palindrome.

  A string is a palindrome if it reads the same forwards and backwards,
  ignoring case and non-alphanumeric characters.

  Args:
    text: The string to check.

  Returns:
    True if the string is a palindrome, False otherwise.
  """
  # Remove non-alphanumeric characters and convert to lowercase
  cleaned_text = re.sub(r'[^a-zA-Z0-9]', '', text).lower()

  # Compare the cleaned string with its reverse
  return cleaned_text == cleaned_text[::-1]

# Example Usage:
print(f"'Madam' is a palindrome: {is_palindrome('Madam')}")
print(f"'A man, a plan, a canal: Panama' is a palindrome: {is_palindrome('A man, a plan, a canal: Panama')}")
print(f"'Hello World' is a palindrome: {is_palindrome('Hello World')}")
print(f"'racecar' is a palindrome: {is_palindrome('racecar')}")
print(f"'No lemon, no melon' is a palindrome: {is_palindrome('No lemon, no melon')}")
```

```
'Madam' is a palindrome: True
'A man, a plan, a canal: Panama' is a palindrome: True
'Hello World' is a palindrome: False
'racecar' is a palindrome: True
'No lemon, no melon' is a palindrome: True
```



Explanation:

1. `is_palindrome(text)` **Function**: This function takes a string `text` as input.
2. **Import** `re`: The `re` module (regular expressions) is imported to help clean the string.
3. **Clean the String**:
   - `re.sub(r'[^a-zA-Z0-9]', '', text)`: This line uses a regular expression to find all characters that are *not* (indicated by `^`) alphanumeric (`a-zA-Z0-9`) and replaces them with an empty string (`''`). This effectively removes spaces, punctuation, and other symbols.
   - `.lower()`: The resulting string is then converted to lowercase to ensure case-insensitive comparison (e.g., 'Madam' and 'madam' are treated the same).
4. **Check for Palindrome**:
   - `cleaned_text[::-1]`: This is a Python slice that creates a reversed version of the `cleaned_text`.
   - `return cleaned_text == cleaned_text[::-1]`: The cleaned string is compared to its reversed version. If they are identical, the function returns `True` (it's a palindrome); otherwise, it returns `False`.

Justification:

This task showed Gemini’s ability to explain unfamiliar code step by step. The explanation of the palindrome-checking function helped in understanding both the logic and possible optimizations.

This supports the idea that AI can act not only as a coding assistant but also as a learning support tool, helping users clearly understand how programs work.