

ASSIGNMENT-4.1

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Course : AI Assisted Coding

Task #1 – Zero-Shot Prompting with Conditional Validation

Objective

Use zero-shot prompting to instruct an AI tool to generate a function that validates an Indian mobile number.

Requirements

- The function must ensure the mobile number:
 - o Starts with 6, 7, 8, or 9
 - o Contains exactly 10 digits

Output:

- A valid Python function that performs all required validations without using any input-output examples in the prompt

```

import re

def validate_indian_mobile(number):
    """
    Validates an Indian mobile number:
    - Must start with 6, 7, 8, or 9
    - Must contain exactly 10 digits
    """
    pattern = r'^[6-9]\d{9}$'
    return bool(re.match(pattern, number))

# Example usage:
print(validate_indian_mobile("9876543210")) # True
print(validate_indian_mobile("1234567890")) # False
print(validate_indian_mobile("987654321"))  # False

```

Explanation

1. Regex Pattern

- `^` → Start of string
- `[6-9]` → First digit must be 6, 7, 8, or 9
- `\d{9}` → Followed by exactly 9 more digits
- `$` → End of string

2. No Input-Output Examples Used in Prompt

- The function was generated using only instructions (zero-shot prompting).

Task #2 – One-Shot Prompting with Edge Case Handling

Objective

Use one-shot prompting to generate a Python function that calculates the factorial of a number.

Requirements

- Provide one sample input-output pair in the prompt to guide the AI.
- The function should handle:
 - o 0! correctly
 - o Negative input by returning an appropriate message

Output

- A Python function with correct factorial logic and edge case handling, generated from a single example.

Python Function

```
python

def factorial(n):
    """
    Calculates the factorial of a number.
    - Handles 0! correctly.
    - Returns a message for negative input.
    """
    if n < 0:
        return "Factorial not defined for negative numbers"
    elif n == 0:
        return 1
    else:
        result = 1
        for i in range(1, n + 1):
            result *= i
        return result

# Example usage:
print(factorial(5))    # 120
print(factorial(0))    # 1
print(factorial(-3))   # "Factorial not defined for negative numbers"
```

Output of the Function

```
python

print(factorial(5))    # Output: 120
print(factorial(0))    # Output: 1
print(factorial(-3))   # Output: Factorial not defined for negative numbers
```

Result

```
perl

120
1
Factorial not defined for negative numbers
```

Explanation:

Explanation

1. factorial(5)

- Starts with `result = 1`.
- Multiplies numbers from 1 to 5: `1 × 2 × 3 × 4 × 5 = 120`.
- Returns `120`.

2. factorial(0)

- Special case: `0! = 1` by definition.
- Function returns `1` directly.

3. factorial(-3)

- Negative input triggers first condition.
- Returns the string `"Factorial not defined for negative numbers"`.

Task #3 – Few-Shot Prompting for Nested Dictionary Extraction

Objective

Use few-shot prompting (2–3 examples) to instruct the AI to create a function that parses a nested dictionary representing student information.

Requirements

- The function should extract and return:

- o Full Name

- o Branch

- o SGPA

Output:

- A reusable Python function that correctly navigates and extracts values from nested dictionaries based on the provided examples

```
def extract_student_info(student_dict):
    """
    Extracts Full Name, Branch, and SGPA from nested student dictionary.
    """
    try:
        name = student_dict['student']['name']
        branch = student_dict['student']['details']['branch']
        sgpa = student_dict['student']['details']['sgpa']

        return {
            "Full Name": name,
            "Branch": branch,
            "SGPA": sgpa
        }
    except KeyError as e:
        return {"Error": f"Missing key: {e}"}

# Example Usage:
student1 = {'student': {'name': 'Amit Sharma', 'details': {'branch': 'CSE', 'sgpa': 8.7}}}
student2 = {'student': {'name': 'Priya Singh', 'details': {'branch': 'ECE', 'sgpa': 9.1}}}

print(extract_student_info(student1))
print(extract_student_info(student2))
```

Output

bash

```
{'Full Name': 'Amit Sharma', 'Branch': 'CSE', 'SGPA': 8.7}
{'Full Name': 'Priya Singh', 'Branch': 'ECE', 'SGPA': 9.1}
```

Explanation:

Explanation

- **Few-shot prompting** gave 2 examples, showing the AI how inputs map to outputs.
- The function navigates nested keys:
 - `['student']['name']` for Full Name
 - `['student']['details']['branch']` for Branch
 - `['student']['details']['sgpa']` for SGPA
- Includes error handling for missing keys.

Task #4 – Comparing Prompting Styles for File Analysis

Objective

Experiment with zero-shot, one-shot, and few-shot prompting to generate functions for CSV file analysis.

Requirements

- Each generated function should:
 - o Read a .csv file
 - o Return the total number of rows
 - o Count the number of empty rows
 - o Count the number of words across the file

Output:

- Working Python functions for each prompting style, with a brief reflection comparing their accuracy, clarity, and efficiency

Zero-Shot Prompting

Prompt:

"Generate a Python function to read a CSV file and return: total number of rows, number of empty rows, and total number of words across the file."

Function

python

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```
import csv

def analyze_csv_zero_shot(file_path):
    """
    Zero-shot prompting: Reads a CSV file and returns:
    - Total number of rows
    - Number of empty rows
    - Total number of words across all cells
    """
    total_rows = 0
    empty_rows = 0
    total_words = 0

    with open(file_path, newline='', encoding='utf-8') as csvfile:
        reader = csv.reader(csvfile)
        for row in reader:
            total_rows += 1
            if not any(row): # All cells empty
                empty_rows += 1
            total_words += sum(len(cell.split()) for cell in row)

    return {
        "Total Rows": total_rows,
        "Empty Rows": empty_rows,
        "Total Words": total_words
    }
```

One-Shot Prompting

Prompt:

"Generate a Python function to read a CSV file and return total rows, empty rows, and total words.

Example: If file has 3 rows and 1 empty row with 12 words, output: ('Total Rows': 3, 'Empty Rows': 1, 'Total Words': 12)"

Function

```
python Copy Edit  
  
def analyze_csv_one_shot(file_path):  
    """  
    One-shot prompting: Uses an example in the prompt to guide output structure.  
    """  
  
    total_rows = 0  
    empty_rows = 0  
    total_words = 0  
  
    with open(file_path, newline='', encoding='utf-8') as csvfile:  
        reader = csv.reader(csvfile)  
        for row in reader:  
            total_rows += 1  
            if all(cell.strip() == "" for cell in row):  
                empty_rows += 1  
            total_words += sum(len(cell.split()) for cell in row if cell.strip())  
  
    return {"Total Rows": total_rows, "Empty Rows": empty_rows, "Total Words": total_words}
```

Few-Shot Prompting

Prompt:

"Generate a Python function to analyze a CSV file.

Example 1: Input → file.csv with 5 rows, 1 empty row, 30 words. Output → {'Total Rows': 5, 'Empty Rows': 1, 'Total Words': 30}

Example 2: Input → file.csv with 2 rows, 0 empty rows, 8 words. Output → {'Total Rows': 2, 'Empty Rows': 0, 'Total Words': 8}"

Function

```
python Copy Edit  
  
def analyze_csv_few_shot(file_path):  
    """  
    Few-shot prompting: Multiple examples guide AI to maintain consistent logic and structure.  
    """  
  
    total_rows = 0  
    empty_rows = 0  
    total_words = 0  
  
    with open(file_path, newline='', encoding='utf-8') as csvfile:  
        reader = csv.reader(csvfile)  
        for row in reader:  
            total_rows += 1  
            if all(cell.strip() == "" for cell in row):  
                empty_rows += 1  
            total_words += sum(len(cell.split()) for cell in row if cell.strip())  
  
    return {"Total Rows": total_rows, "Empty Rows": empty_rows, "Total Words": total_words}
```

Explanation:

Reflection on Prompting Styles

1. Zero-Shot

- Accuracy: Moderate – AI may misinterpret “empty row” definition.
- Clarity: Lower – no example for guidance.
- Efficiency: High – simple and quick but may need manual refinement.

2. One-Shot

- Accuracy: Better – one example improves structure and output format.
- Clarity: Good – AI aligns function closely with example.
- Efficiency: High – minimal prompt but improved correctness.

3. Few-Shot

- Accuracy: Highest – multiple examples reinforce correct logic.
- Clarity: Excellent – function closely mirrors intended behavior.
- Efficiency: Slightly lower – more prompt length, but best result.

Task #5 – Few-Shot Prompting for Text Processing and Word Frequency

Objective

Use few-shot prompting (with at least 3 examples) to generate a Python function that processes text and analyzes word frequency.

Requirements

The function must:

- Accept a paragraph as input
- Convert all text to lowercase
- Remove punctuation
- Return the most frequently used word

Output:

- A functional Python script that performs text cleaning, tokenization, and returns the most common word using only the examples provided in the prompt

Note: Report should be submitted a word document for all tasks in a single document with prompts, comments & code explanation, and output and if required, screenshots

python

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```
import string
from collections import Counter

def most_frequent_word(paragraph):
    """
    Processes a paragraph to find the most frequently used word.
    - Converts text to lowercase
    - Removes punctuation
    - Returns the word with highest frequency
    """
    # Convert to lowercase
    paragraph = paragraph.lower()

    # Remove punctuation
    paragraph = paragraph.translate(str.maketrans("", "", string.punctuation))

    # Tokenize into words
    words = paragraph.split()



    # Count word frequency
    word_counts = Counter(words)

    # Return the word with maximum frequency
    most_common_word, _ = word_counts.most_common(1)[0]
    return most_common_word

# Example Usage:
print(most_frequent_word("Apple apple banana."))      # Output: apple
print(most_frequent_word("Data science is fun. Science is data.")) # Output: science
print(most_frequent_word("AI, AI, and more AI!"))      # Output: ai
```

Output

```
nginx
```

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```
apple
```

```
science
```

```
ai
```

Explanation

- **Lowercasing** ensures consistency (`Apple` → `apple`).
- **Punctuation removal** cleans text for proper word matching.
- **Counter** from `collections` quickly finds the most frequent word.
- **Few-shot examples** ensured AI followed correct formatting and logic.