

AI ASSISTANT CODING

Assignment – 4.2

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Question:

Lab 4: Advanced Prompt Engineering – Zero-shot, One-shot, and Few-shot Techniques

Lab Objectives:

- To explore and apply different levels of prompt examples in AI-assisted code generation.
- To understand how zero-shot, one-shot, and few-shot prompting affect AI output quality.
- To evaluate the impact of context richness and example quantity on AI performance.
- To build awareness of prompt strategy effectiveness for different problem types.

Lab Outcomes (LOs):

After completing this lab, students will be able to:

- Use zero-shot prompting to instruct AI with minimal context.
- Use one-shot prompting with a single example to guide AI code generation.
- Apply few-shot prompting using multiple examples to improve AI responses.
- Compare AI outputs across the three prompting strategies.

Task Description-1

- Zero-shot: Prompt AI with only the instruction. Write a Python function to determine whether a given number is prime.

Prompt:

Generate a python program to determine whether the given number is prime only based on conditions without relying on examples

```
prime_checker.py > ...
1  def is_prime(n):
2      if n == 2:
3          return True
4      if n % 2 == 0:
5          return False
6      # Check odd divisors up to sqrt(n)
7      for i in range(3, int(n**0.5) + 1, 2):
8          if n % i == 0:
9              return False
10     return True
11 def main():
12     """Main function to get user input and check if number is prime."""
13     try:
14         num = int(input("Enter a number to check if it's prime: "))
15         if is_prime(num):
16             print(f"{num} is a PRIME number!")
17         else:
18             print(f"{num} is NOT a prime number.")
19     except ValueError:
20         print("Error: Please enter a valid integer.")
21     if __name__ == "__main__":
22         main()
23
24
25
```

Expected Output-1

- A basic Python function to check if a number is prime, demonstrating correct logical conditions without relying on examples or additional context

```
Enter a number to check if it's prime: 6
6 is NOT a prime number.
```

Task Description-2

- One-shot: Provide one example: Input: [1, 2, 3, 4], Output: 10 to help AI generate a function that calculates the sum of elements in a list.

Prompt:

Generate a python program to sum of elements in a list i will provide you an example input and output

input: [1,2,3,4]

output:10

provide the code in such a way so that the instructions have to be taken by the code in the same way as given example give me an error free code with optimization.

```
list_sum.py > sum_list
1 def sum_list(elements):
2     """
3     Calculate the sum of all elements in a list.
4
5     Args:
6         elements: A list of numbers to sum
7
8     Returns:
9         The sum of all elements in the list
10    """
11    return sum(elements)
12
13
14 def main():
15     """Main function to get list input and calculate sum."""
16     try:
17         # Get input from user in list format: [1,2,3,4]
18         user_input = input("Enter a list of numbers (e.g., [1,2,3,4]): ").strip()
19
20         # Parse the input string to convert it to a list
21         elements = eval(user_input)
22
23         # Validate that input is a list
24         if not isinstance(elements, list):
25             print("Error: Please enter a valid list format.")
26             return
27
```

```

list_sum.py > sum_list
14  def main():
27
28      # Check if list is empty
29      if not elements:
30          print("Error: List cannot be empty.")
31          return
32
33      # Verify all elements are numbers
34      if not all(isinstance(x, (int, float)) for x in elements):
35          print("Error: List must contain only numbers.")
36          return
37
38      # Calculate and display the sum
39      result = sum_list(elements)
40      print(f"input: {elements}")
41      print(f"output: {result}")
42
43  except (ValueError, SyntaxError):
44      print("Error: Please enter a valid list format like [1,2,3,4]")
45  except Exception as e:
46      print(f"Error: {str(e)}")
47
48
49  if __name__ == "__main__":
50      main()
51

```

Expected Output-2

- A correct conversion function guided by the single example.

```

Enter a list of numbers (e.g., [1,2,3,4]): [4,5,6,2,7]
input: [4, 5, 6, 2, 7]
output: 24

```

Task Description-3

- Few-shot: Give 2–3 examples to create a function that extracts digits from an alphanumeric string.

Prompt:

write a program that extract digits from an alphanumeric string.

Examples:

"jb54jdjk" ---> 54

"abcd098ijh" ---> 098

"mno653prg" ---> 653

```

AIAC_Assignment-4.2 > ...
1 def extract_digits(s):
2     """
3         Extracts digits from an alphanumeric string and returns them as a string.
4
5     Args:
6         s: An alphanumeric string
7
8     Returns:
9         A string formed by concatenating all digits in the string
10    """
11    digits = ''.join(char for char in s if char.isdigit())
12    return digits if digits else "0"
13
14
15    # Test cases
16    print(extract_digits("jb54jdjk"))      # 54
17    print(extract_digits("abcd098ijh"))    # 098
18    print(extract_digits("mno653prg"))    # 653
19    print(extract_digits("ach12bg"))       # 12
20    print(extract_digits("th9n1ljfm"))     # 91
21    print(extract_digits("asd986lkj"))     # 986

```

Expected Output-3

- Accurate function that returns only the digits from alphanumeric string.

```

D:\iran\OneDrive\Desktop\AIAC Assignments\AIAC_Assignment
54
098
653
12
91
D 986

```

Task Description-4

- Compare zero-shot vs few-shot prompting for generating a function that counts the number of vowels in a string.

Prompt:

Compare zero-shot vs few-shot prompting for generating a function that counts the number of vowels in a string.

```

25 # Zero-shot prompting example
26 def count_vowels_zero_shot(s):
27     """Count vowels in a string without examples."""
28     return sum(1 for char in s.lower() if char in 'aeiou')
29
30
31 # Few-shot prompting example with test cases
32 def count_vowels_few_shot(s):
33     """
34     Count the number of vowels in a string.
35
36     Examples:
37     "hello" -> 2 (e, o)
38     "programming" -> 3 (o, a, i)
39     "aeiou" -> 5
40     """
41     return sum(1 for char in s.lower() if char in 'aeiou')
42
43
44 # Test both approaches
45 print(count_vowels_zero_shot("hello"))          # 2
46 print(count_vowels_few_shot("hello"))           # 2
47 print(count_vowels_zero_shot("programming"))    # 3
48 print(count_vowels_few_shot("programming"))    # 3

```

Expected Output-4

- Output comparison + student explanation on how examples helped the model.

```

XOJ (Ubuntu 11.04 (debug)) [root@XOJ ~]# python
2
2
3
3

```

Task Description-5

- Use few-shot prompting with 3 sample inputs to generate a function that determines the minimum of three numbers without using the built-in min () function.

Prompt:

Generate a function that determines the minimum of three numbers without using the built-in min () function.

Example: input: 4 5 3

output: minimum among given numbers is 3

input: 5 4 7

output: minimum among given numbers is 4

input: 10 200 1000

output: minimum among given numbers is 10

first analyze the given example then generate the code accordingly
give me the optimized code using valid conditions

```
1  def find_minimum(a, b, c):
2      """Function to find the minimum among three numbers."""
3      # Compare a with b first
4      if a <= b:
5          # If a is less than or equal to b, compare a with c
6          if a <= c:
7              return a
8          else:
9              return c
10     else:
11         # If b is less than a, compare b with c
12         if b <= c:
13             return b
14         else:
15             return c
16
17
18 def main():
19     """Main function to get input and find minimum of three numbers."""
20     try:
21         # Get three numbers from user
22         print("Enter three numbers separated by spaces:")
23         user_input = input().strip()
24
25         # Parse input
26         numbers = list(map(int, user_input.split()))
27
```

```
26     numbers = list(map(int, user_input.split()))
27
28     # Validate that we have exactly 3 numbers
29     if len(numbers) != 3:
30         print("Error: Please enter exactly 3 numbers.")
31         return
32
33     a, b, c = numbers
34
35     # Find and display the minimum
36     minimum = find_minimum(a, b, c)
37     print(f"input: {a} {b} {c}")
38     print(f"output: minimum among given numbers is {minimum}")
39
40 except ValueError:
41     print("Error: Please enter valid numbers separated by spaces.")
42 except Exception as e:
43     print(f"Error: {str(e)}")
44
45
46 if __name__ == "__main__":
47     main()
48
```

Expected Output-5

- A function that handles all cases with correct logic based on example patterns.

```
Enter three numbers separated by spaces:
```

```
4 2 8
```

```
input: 4 2 8
```

```
output: minimum among given numbers is 2
```