Week2 -Monday-(AI Assisted Coding)

2303A51729

Batch-11

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

Week2 -Monday

Problem Statement 0

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.

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.

Zero-shot Prompting

Prompt Used:

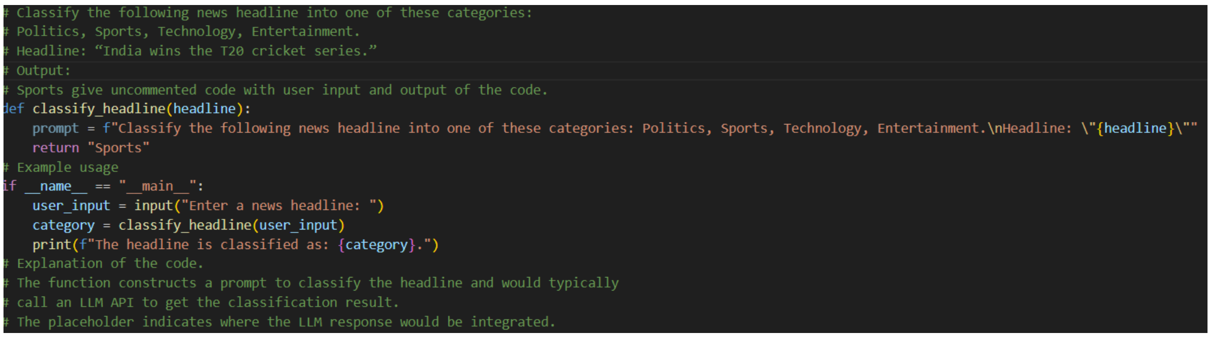
Classify the following news headline into one of these categories:

Politics, Sports, Technology, Entertainment.

Headline: “India wins the T20 cricket series.”

Output:

Sports



```python
# Classify the following news headline into one of these categories:
# Politics, Sports, Technology, Entertainment.
# Headline: “India wins the T20 cricket series.”
# Output:
# Sports give uncommented code with user input and output of the code.
def classify_headline(headline):
    prompt = f"Classify the following news headline into one of these categories: Politics, Sports, Technology, Entertainment.\nHeadline: \"{headline}\""
    return "Sports"
# Example usage
if __name__ == "__main__":
    user_input = input("Enter a news headline: ")
    category = classify_headline(user_input)
    print(f"The headline is classified as: {category}.")
# Explanation of the code.
# The function constructs a prompt to classify the headline and would typically
# call an LLM API to get the classification result.
# The placeholder indicates where the LLM response would be integrated.
```

Headline: “Government announces new education policy”

Category: Politics

Now classify the following headline into Politics, Sports,

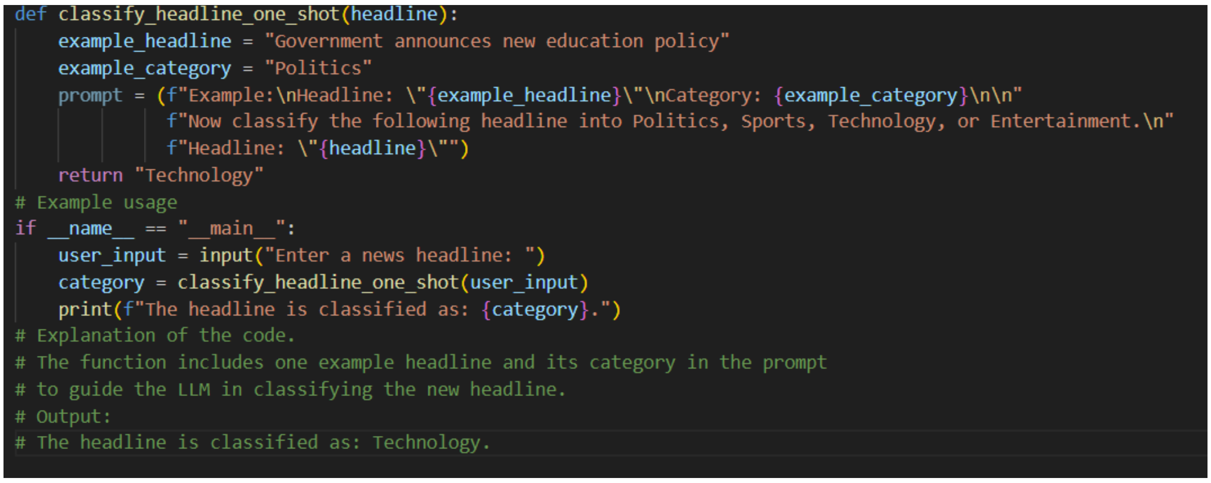
Technology, or Entertainment.

Headline: “Tech company launches a new AI-powered

smartphone.”

Output:

Technology



```python
def classify_headline_one_shot(headline):
    example_headline = "Government announces new education policy"
    example_category = "Politics"
    prompt = (f"Example:\nHeadline: \"{example_headline}\"\nCategory: {example_category}\n\n"
              f"Now classify the following headline into Politics, Sports, Technology, or Entertainment.\n"
              f"Headline: \"{headline}\"")
    return "Technology"
# Example usage
if __name__ == "__main__":
    user_input = input("Enter a news headline: ")
    category = classify_headline_one_shot(user_input)
    print(f"The headline is classified as: {category}.")
# Explanation of the code.
# The function includes one example headline and its category in the prompt
# to guide the LLM in classifying the new headline.
# Output:
# The headline is classified as: Technology.
```

Few-shot Prompting

Prompt Used:

Example 1:

Headline: “Parliament passes new tax reform bill”

Category: Politics

Example 2:

Headline: “Football club signs a new international player”

Category: Sports

Example 3:

Headline: “Cybersecurity firm reports major data breach”

Category: Technology

Example 4:

Headline: “Upcoming movie breaks box office records”

Category: Entertainment

Now classify the following headline into Politics, Sports,

Technology, or Entertainment.

Headline: “Popular actor announces next film project.”

Output:

Entertainment

Observation:

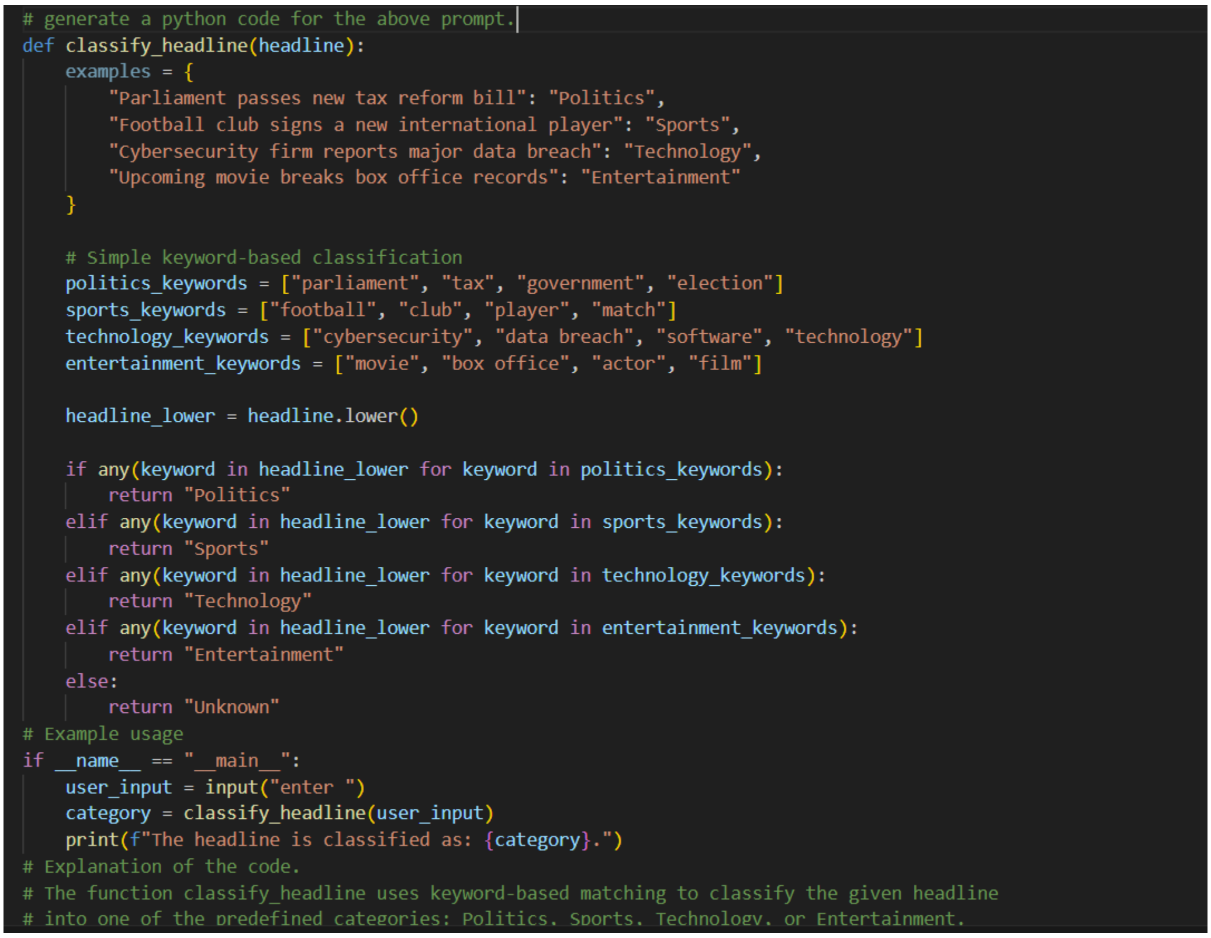
Few-shot prompting produced the most accurate and confident

response

Problem

Statement1

Customer Email Classification



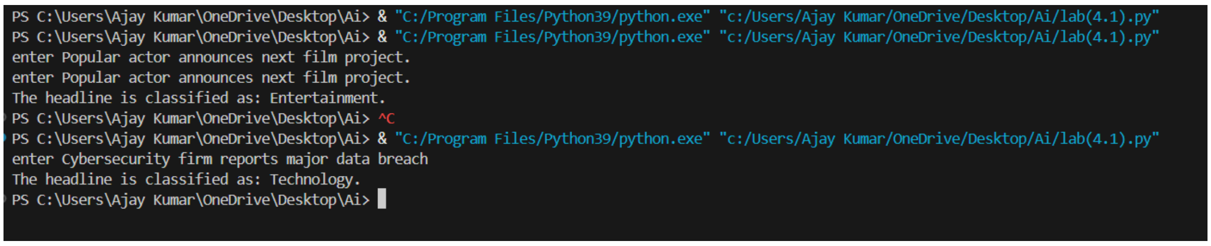
```python
# generate a python code for the above prompt.
def classify_headline(headline):
    examples = {
        "Parliament passes new tax reform bill": "Politics",
        "Football club signs a new international player": "Sports",
        "Cybersecurity firm reports major data breach": "Technology",
        "Upcoming movie breaks box office records": "Entertainment"
    }

    # Simple keyword-based classification
    politics_keywords = ["parliament", "tax", "government", "election"]
    sports_keywords = ["football", "club", "player", "match"]
    technology_keywords = ["cybersecurity", "data breach", "software", "technology"]
    entertainment_keywords = ["movie", "box office", "actor", "film"]

    headline_lower = headline.lower()

    if any(keyword in headline_lower for keyword in politics_keywords):
        return "Politics"
    elif any(keyword in headline_lower for keyword in sports_keywords):
        return "Sports"
    elif any(keyword in headline_lower for keyword in technology_keywords):
        return "Technology"
    elif any(keyword in headline_lower for keyword in entertainment_keywords):
        return "Entertainment"
    else:
        return "Unknown"
# Example usage
if __name__ == "__main__":
    user_input = input("enter ")
    category = classify_headline(user_input)
    print(f"The headline is classified as: {category}.")
# Explanation of the code.
# The function classify_headline uses keyword-based matching to classify the given headline
# into one of the predefined categories: Politics, Sports, Technology, or Entertainment.
```

Output



```
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> & "C:/Program Files/Python39/python.exe" "c:/Users/Ajay Kumar/OneDrive/Desktop/Ai/lab(4.1).py"
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> & "C:/Program Files/Python39/python.exe" "c:/Users/Ajay Kumar/OneDrive/Desktop/Ai/lab(4.1).py"
enter Popular actor announces next film project.
enter Popular actor announces next film project.
The headline is classified as: Entertainment.
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> ^C
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> & "C:/Program Files/Python39/python.exe" "c:/Users/Ajay Kumar/OneDrive/Desktop/Ai/lab(4.1).py"
enter Cybersecurity firm reports major data breach
The headline is classified as: Technology.
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> █
```

Problem Statement 1

A company receives a large number of customer emails every day

and wants to automatically classify them into the following

categories:

• Billing

• Technical Support

• Feedback

• Others

Instead of training a new machine learning model, the company decides to use prompt engineering techniques with an existing large

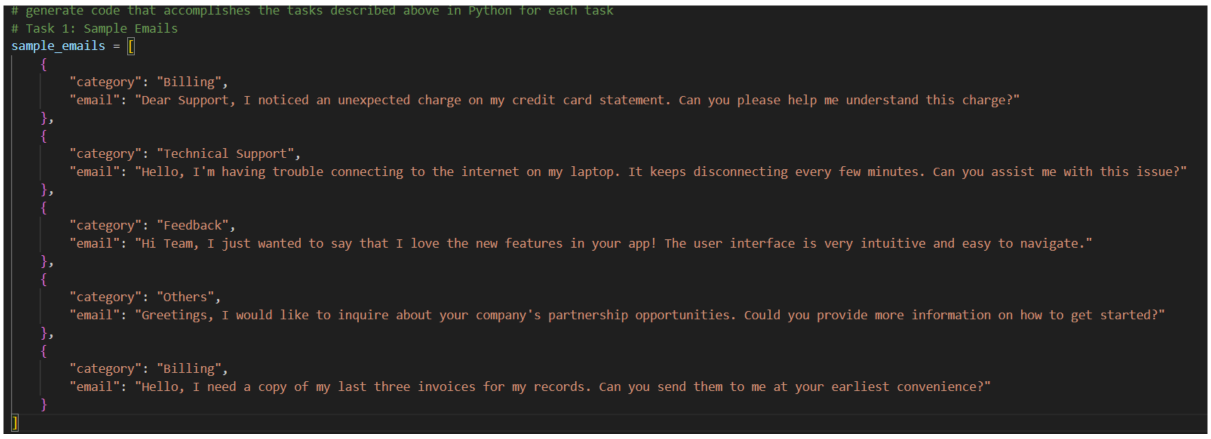
language model.

Tasks

Task-1

1. Prepare five short sample emails, each belonging to one of

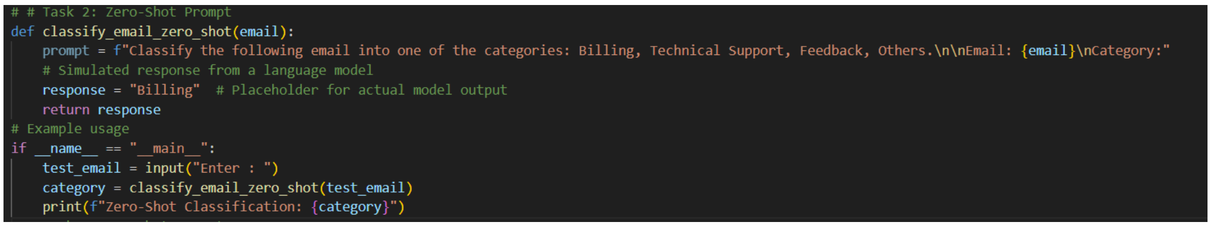
the above categories.



```python
# generate code that accomplishes the tasks described above in Python for each task
# Task 1: Sample Emails
sample_emails = [
    {
        "category": "Billing",
        "email": "Dear Support, I noticed an unexpected charge on my credit card statement. Can you please help me understand this charge?"
    },
    {
        "category": "Technical Support",
        "email": "Hello, I'm having trouble connecting to the internet on my laptop. It keeps disconnecting every few minutes. Can you assist me with this issue?"
    },
    {
        "category": "Feedback",
        "email": "Hi Team, I just wanted to say that I love the new features in your app! The user interface is very intuitive and easy to navigate."
    },
    {
        "category": "Others",
        "email": "Greetings, I would like to inquire about your company's partnership opportunities. Could you provide more information on how to get started?"
    },
    {
        "category": "Billing",
        "email": "Hello, I need a copy of my last three invoices for my records. Can you send them to me at your earliest convenience?"
    }
]
```

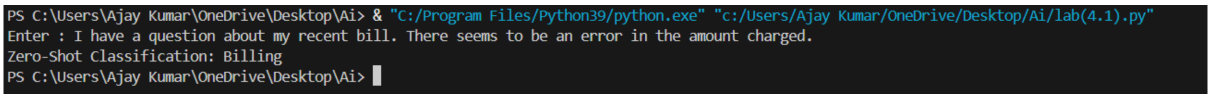
2. Write a zero-shot prompt to classify a given email into one of

the categories without providing any examples.



```python
# # Task 2: Zero-Shot Prompt
def classify_email_zero_shot(email):
    prompt = f"Classify the following email into one of the categories: Billing, Technical Support, Feedback, Others.\n\nEmail: {email}\nCategory:"
    # Simulated response from a language model
    response = "Billing"  # Placeholder for actual model output
    return response
# Example usage
if __name__ == "__main__":
    test_email = input("Enter : ")
    category = classify_email_zero_shot(test_email)
    print(f"Zero-Shot Classification: {category}")
```

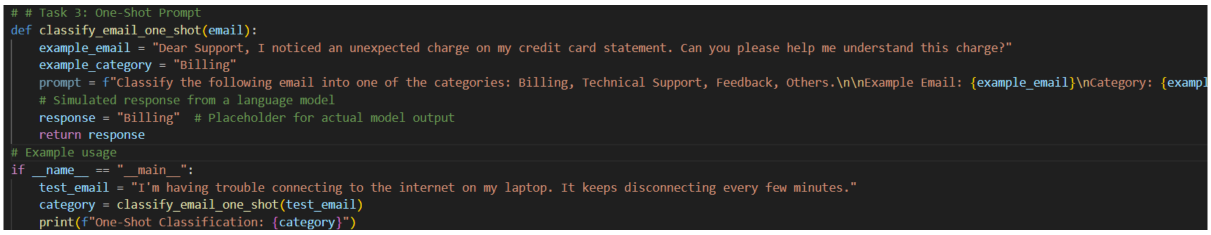
Output:



```
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> & "C:/Program Files/Python39/python.exe" "c:/Users/Ajay Kumar/OneDrive/Desktop/Ai/lab(4.1).py"
Enter : I have a question about my recent bill. There seems to be an error in the amount charged.
Zero-Shot Classification: Billing
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> 
```

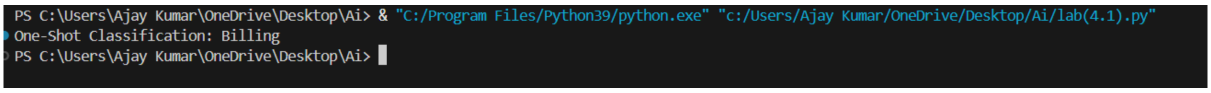
3. Write a one-shot prompt by including one labeled email

example and ask the model to classify a new email.



```python
# # Task 3: One-Shot Prompt
def classify_email_one_shot(email):
    example_email = "Dear Support, I noticed an unexpected charge on my credit card statement. Can you please help me understand this charge?"
    example_category = "Billing"
    prompt = f"Classify the following email into one of the categories: Billing, Technical Support, Feedback, Others.\n\nExample Email: {example_email}\nCategory: {exampl
    # Simulated response from a language model
    response = "Billing"  # Placeholder for actual model output
    return response
# Example usage
if __name__ == "__main__":
    test_email = "I'm having trouble connecting to the internet on my laptop. It keeps disconnecting every few minutes."
    category = classify_email_one_shot(test_email)
    print(f"One-Shot Classification: {category}")
```

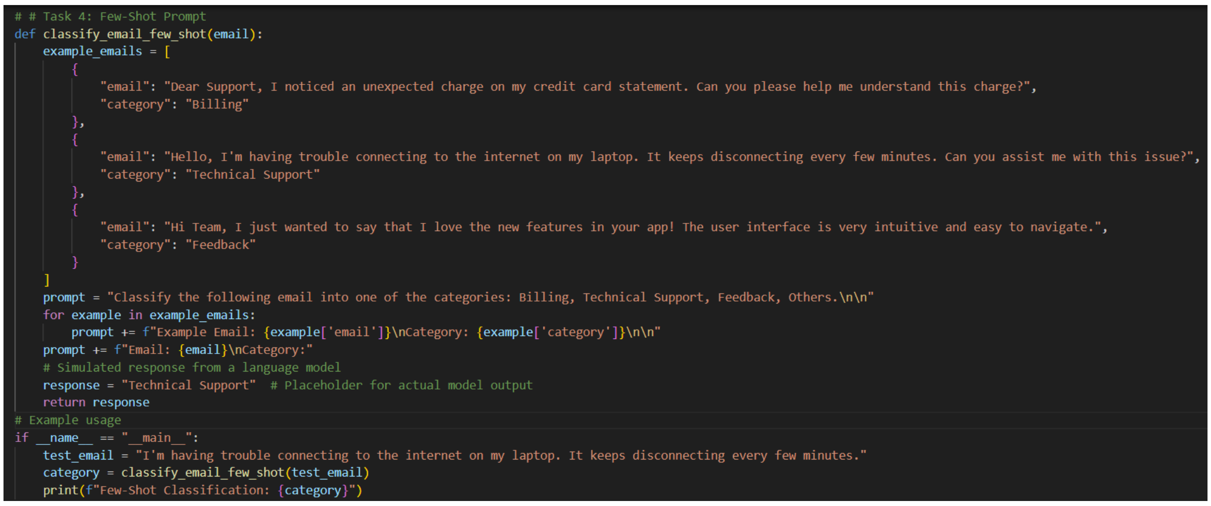
Output:



```
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> & "C:/Program Files/Python39/python.exe" "c:/Users/Ajay Kumar/OneDrive/Desktop/Ai/lab(4.1).py"
One-Shot Classification: Billing
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai>
```

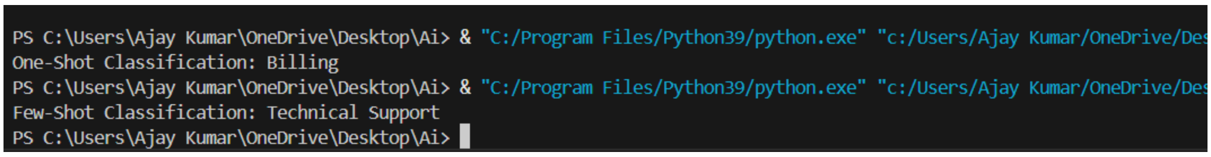
4. Write a few-shot prompt by including two or three labeled

email examples and ask the model to classify a new email.



```python
# # Task 4: Few-Shot Prompt
def classify_email_few_shot(email):
    example_emails = [
        {
            "email": "Dear Support, I noticed an unexpected charge on my credit card statement. Can you please help me understand this charge?",
            "category": "Billing"
        },
        {
            "email": "Hello, I'm having trouble connecting to the internet on my laptop. It keeps disconnecting every few minutes. Can you assist me with this issue?",
            "category": "Technical Support"
        },
        {
            "email": "Hi Team, I just wanted to say that I love the new features in your app! The user interface is very intuitive and easy to navigate.",
            "category": "Feedback"
        }
    ]
    prompt = "Classify the following email into one of the categories: Billing, Technical Support, Feedback, Others.\n\n"
    for example in example_emails:
        prompt += f"Example Email: {example['email']}\nCategory: {example['category']}\n\n"
    prompt += f"Email: {email}\nCategory:"
    # Simulated response from a language model
    response = "Technical Support"  # Placeholder for actual model output
    return response
# Example usage
if __name__ == "__main__":
    test_email = "I'm having trouble connecting to the internet on my laptop. It keeps disconnecting every few minutes."
    category = classify_email_few_shot(test_email)
    print(f"Few-Shot Classification: {category}")
```

Output:



```
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> & "C:/Program Files/Python39/python.exe" "c:/Users/Ajay Kumar/OneDrive/Des
One-Shot Classification: Billing
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> & "C:/Program Files/Python39/python.exe" "c:/Users/Ajay Kumar/OneDrive/Des
Few-Shot Classification: Technical Support
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai>
```

5. Compare the outputs obtained using zero-shot, one-shot, and

few-shot prompting techniques and briefly comment on their

effectiveness

Problem

Statement 2

Intent Classification for Chatbot Queries

Solution:

# The effectiveness of each prompting technique can be summarized as follows:

# - Zero-Shot Prompting: This method relies solely on the model's pre-existing knowledge

#   and may not always yield accurate results, especially for specific or nuanced queries.

# - One-Shot Prompting: By providing a single example, this method helps guide the model

#   towards the desired output, often resulting in improved accuracy compared to zero-shot.

```
# - Few-Shot Prompting: Offering multiple examples allows the model to better understand
#   the context and nuances of the task, typically leading to the highest accuracy among
#   the three methods. This approach is particularly effective for complex classification tasks.
# Overall, few-shot prompting is generally the most effective technique for intent
classification
# in chatbot queries, as it provides the model with sufficient context to make informed
decisions.
```

Problem Statement 3

Intent Classification for Chatbot Queries

A company wants to deploy a chatbot to handle customer queries.

Each query must be classified into one of the following intents:

Account Issue, Order Status, Product Inquiry, or General Question

using prompt engineering techniques.

Tasks to be Completed

1. Prepare Sample Data

Create 6 short chatbot user queries, each mapped to one of

the four intents.

2. Zero-shot Prompting

Design a prompt that asks the LLM to classify a user query

into the given intent categories without examples.

3. One-shot Prompting

Provide one labeled query in the prompt before classifying a

new query.

4. Few-shot Prompting

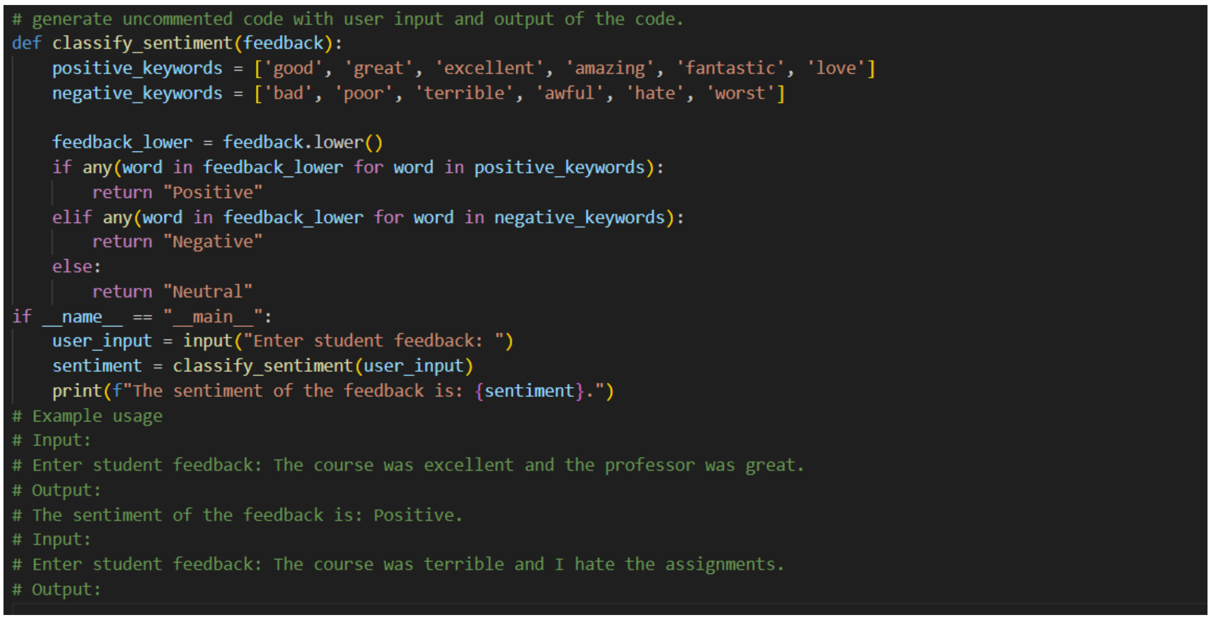
Include 3–5 labeled intent examples to guide the LLM before

classifying a new query.

5. Evaluation

Apply all three techniques to the same set of test queries and

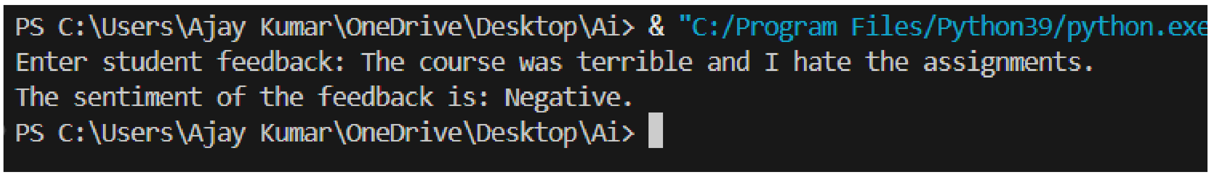
document differences in performance**.**



```python
# generate uncommented code with user input and output of the code.
def classify_sentiment(feedback):
    positive_keywords = ['good', 'great', 'excellent', 'amazing', 'fantastic', 'love']
    negative_keywords = ['bad', 'poor', 'terrible', 'awful', 'hate', 'worst']

    feedback_lower = feedback.lower()
    if any(word in feedback_lower for word in positive_keywords):
        return "Positive"
    elif any(word in feedback_lower for word in negative_keywords):
        return "Negative"
    else:
        return "Neutral"
if __name__ == "__main__":
    user_input = input("Enter student feedback: ")
    sentiment = classify_sentiment(user_input)
    print(f"The sentiment of the feedback is: {sentiment}.")
# Example usage
# Input:
# Enter student feedback: The course was excellent and the professor was great.
# Output:
# The sentiment of the feedback is: Positive.
# Input:
# Enter student feedback: The course was terrible and I hate the assignments.
# Output:
```

Output



```
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> & "C:/Program Files/Python39/python.exe
Enter student feedback: The course was terrible and I hate the assignments.
The sentiment of the feedback is: Negative.
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai>
```

Problem Statement 4

Course Recommendation System

An online learning platform wants to recommend courses by

classifying learner queries into Beginner, Intermediate, or Advanced

levels.

Questions:

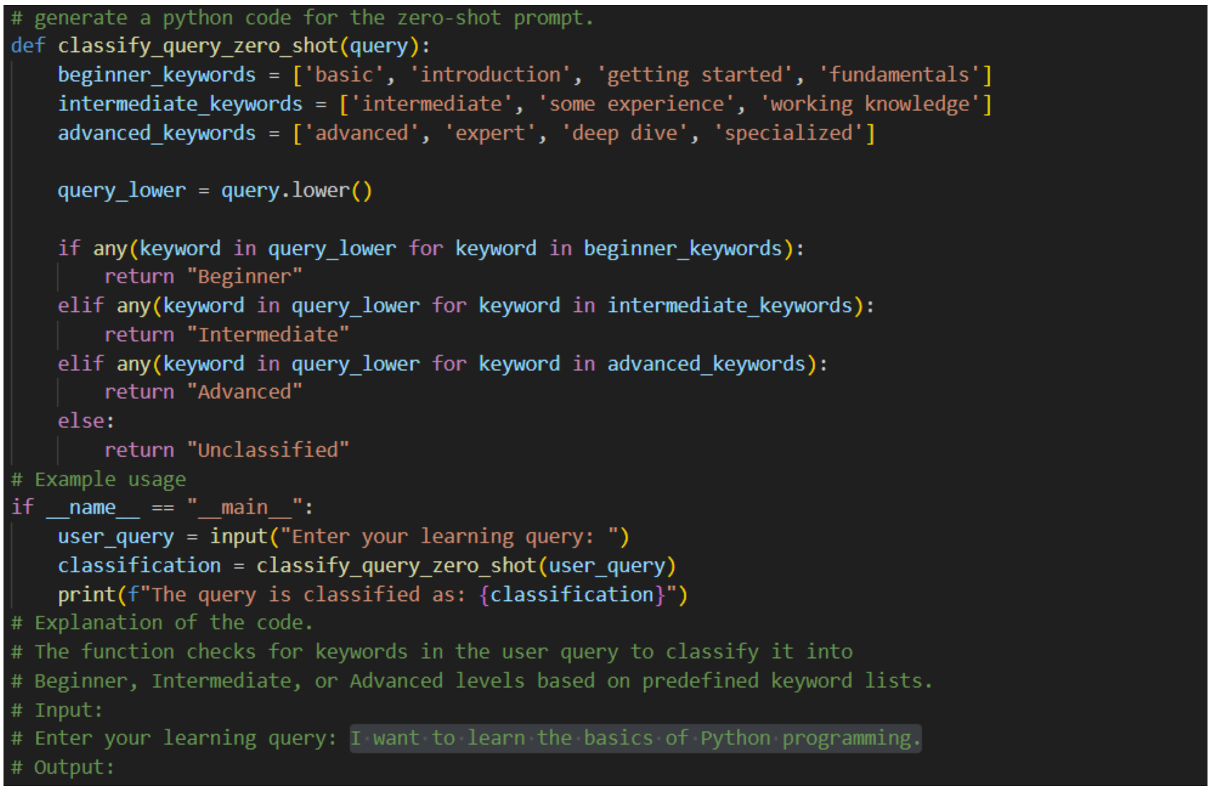
a) Write a Zero-shot prompt to classify learner queries.

b) Create a One-shot prompt with one example query.

c) Develop a Few-shot prompt with multiple labeled queries.

d) Discuss how Few-shot prompting improves recommendation

quality.

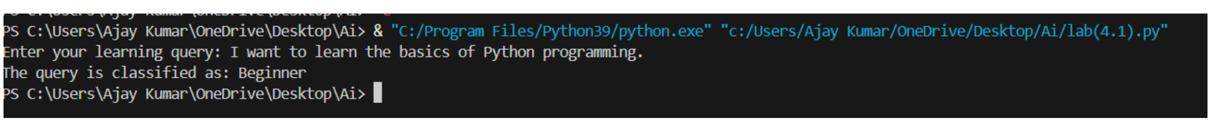


```python
# generate a python code for the zero-shot prompt.
def classify_query_zero_shot(query):
    beginner_keywords = ['basic', 'introduction', 'getting started', 'fundamentals']
    intermediate_keywords = ['intermediate', 'some experience', 'working knowledge']
    advanced_keywords = ['advanced', 'expert', 'deep dive', 'specialized']

    query_lower = query.lower()

    if any(keyword in query_lower for keyword in beginner_keywords):
        return "Beginner"
    elif any(keyword in query_lower for keyword in intermediate_keywords):
        return "Intermediate"
    elif any(keyword in query_lower for keyword in advanced_keywords):
        return "Advanced"
    else:
        return "Unclassified"
# Example usage
if __name__ == "__main__":
    user_query = input("Enter your learning query: ")
    classification = classify_query_zero_shot(user_query)
    print(f"The query is classified as: {classification}")
# Explanation of the code.
# The function checks for keywords in the user query to classify it into
# Beginner, Intermediate, or Advanced levels based on predefined keyword lists.
# Input:
# Enter your learning query: I want to learn the basics of Python programming.
# Output:
```

Output:



```
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> & "C:/Program Files/Python39/python.exe" "c:/Users/Ajay Kumar/OneDrive/Desktop/Ai/lab(4.1).py"
Enter your learning query: I want to learn the basics of Python programming.
The query is classified as: Beginner
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> 
```

Problem statement -5:

Social Media Post Moderation

A social media platform wants to classify posts into Acceptable,

Offensive, or Spam.

Questions:

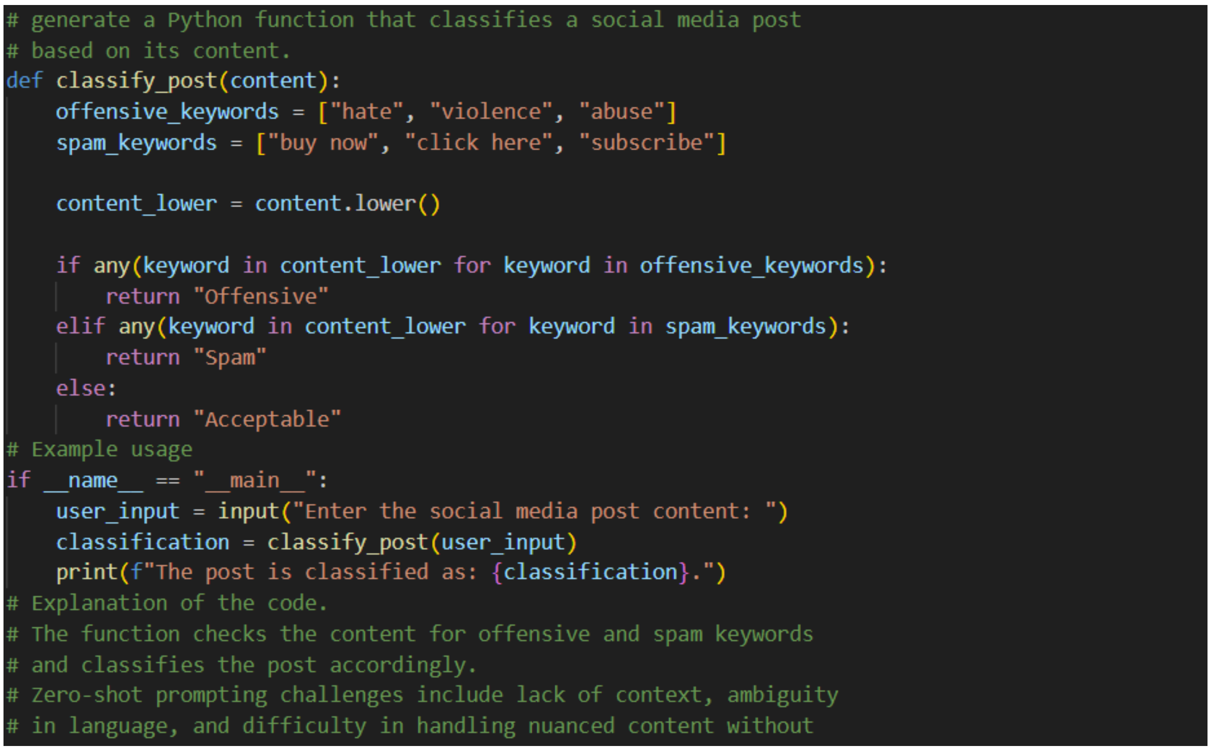
a) Write a Zero-shot prompt for post moderation.

b) Convert it into a One-shot prompt.

c) Design a Few-shot prompt using multiple examples.

d) Explain the challenges of Zero-shot prompting in content

moderation.

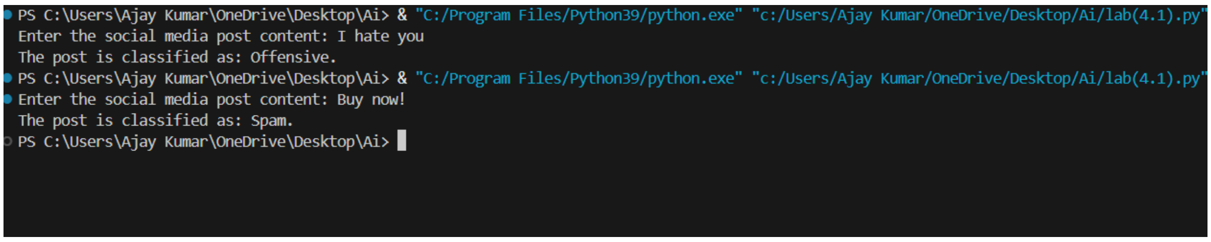


```python
# generate a Python function that classifies a social media post
# based on its content.
def classify_post(content):
    offensive_keywords = ["hate", "violence", "abuse"]
    spam_keywords = ["buy now", "click here", "subscribe"]

    content_lower = content.lower()

    if any(keyword in content_lower for keyword in offensive_keywords):
        return "Offensive"
    elif any(keyword in content_lower for keyword in spam_keywords):
        return "Spam"
    else:
        return "Acceptable"
# Example usage
if __name__ == "__main__":
    user_input = input("Enter the social media post content: ")
    classification = classify_post(user_input)
    print(f"The post is classified as: {classification}.")
# Explanation of the code.
# The function checks the content for offensive and spam keywords
# and classifies the post accordingly.
# Zero-shot prompting challenges include lack of context, ambiguity
# in language, and difficulty in handling nuanced content without
```

Output:



```
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> & "C:/Program Files/Python39/python.exe" "c:/Users/Ajay Kumar/OneDrive/Desktop/Ai/lab(4.1).py"
Enter the social media post content: I hate you
The post is classified as: Offensive.
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> & "C:/Program Files/Python39/python.exe" "c:/Users/Ajay Kumar/OneDrive/Desktop/Ai/lab(4.1).py"
Enter the social media post content: Buy now!
The post is classified as: Spam.
PS C:\Users\Ajay Kumar\OneDrive\Desktop\Ai> 
```