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

Objective

To explore and compare Zero-shot, One-shot, and Few-shot prompting techniques for classifying emails into predefined categories using a large language model (LLM).

Assignment Scenario

Suppose you work for a company that receives hundreds of customer emails daily. Management wants to automatically classify these emails into categories like "Billing", "Technical Support", "Feedback", and "Others" before assigning them to appropriate departments. Instead of training a new model, your task is to use prompt engineering techniques with an existing LLM to handle the classification.

1. Sample Email Dataset

No.	Email Text	Category
1	I have not received my invoice for last month.	Billing
2	My payment failed but the amount was deducted from my account.	Billing
3	The app crashes every time I try to open it.	Technical Support

4	How do I reset my account password?	Technical Support
5	I really like the new features in the latest update!	Feedback
6	Your customer service team was very helpful.	Feedback
7	Please unsubscribe me from your newsletter.	Others
8	Can you provide the terms and conditions for your service?	Others
9	There is a typo in your website footer.	Feedback
10	I keep getting error 404 when accessing my dashboard.	Technical Support

2. Prompt Designs

2.1 Zero-shot Prompt

Email:

"My payment failed but the amount was deducted from my account."

2.2 One-shot Prompt

Here is an example:

Email: "I have not received my invoice for last month."

Category: Billing

Now, classify the following email into one of the categories: Billing, Technical Support, Feedback, Others.

Email:

"My payment failed but the amount was deducted from my account.

Here are some examples:

Email: "I have not received my invoice for last month."

Category: Billing

Email: "The app crashes every time I try to open it."

Category: Technical Support

Email: "I really like the new features in the latest update!"

Category: Feedback

Email: "Please unsubscribe me from your newsletter."

Category: Others

Email:

"My payment failed but the amount was deducted from my account."

3. Evaluation Table-

Email No.	True Category	Zero-shot Result	One-shot Result	Few-shot Result	Notes on Clarity
1	Billing	Billing	Billing	Billing	Clear in all methods
2	Billing	Billing	Billing	Billing	Clear in all methods
3	Technical Support	Technical Support	Technical Support	Technical Support	Few-shot gave more confidence
4	Technical Support	Technical Support	Technical Support	Technical Support	Clear in all methods
5	Feedback	Feedback	Feedback	Feedback	Clear in all methods
6	Feedback	Feedback	Feedback	Feedback	Clear in all methods
7	Others	Others	Others	Others	Clear in all methods

8	Others	Others	Others	Others	Clear in all methods
9	Feedback	Others	Feedback	Feedback	Zero-shot confused, others okay
10	Technical Support	Technical Support	Technical Support	Technical Support	Clear in all methods

4. Comparison & Analysis

- Zero-shot: Sometimes struggles with less common wordings or ambiguous cases.

- One-shot: Improves accuracy by providing an example, but may still err in borderline cases.

- Few-shot: Most reliable. Multiple examples help the model recognize patterns and reduce ambiguity, leading to higher accuracy and clarity.

5. Reflection

Based on the results, the few-shot prompting technique produced the most accurate and clear classifications. It provided enough context to the model, reducing ambiguity and helping it correctly identify even less obvious categories. One-shot was better than zero-shot, especially for borderline cases, but less reliable than few-shot. Zero-shot sometimes struggled with emails that were not direct or had less common phrasing.

Few-shot was most effective because the model could infer the pattern from multiple examples, improving both understanding and accuracy.

6. Tools Used

- VS Code with Github Copilot

- Google Colab with Gemini (for prompt testing)

7. Conclusion

Prompt engineering is a powerful technique for leveraging large language models in classification tasks without additional training. Few-shot prompting, in particular, demonstrates significant advantages in accuracy and reliability for real-world tasks like email classification.

BY – K. SIDHARTHA REDDY

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