LING3401 Linguistics and Information Technology

Tutorial: Prompting large language models

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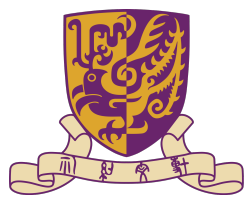

What is prompt engineering?

- The process of designing inputs to guide a language model's output
- Similar to giving instructions: the way you ask affects the response

Why is prompting important?

- LLMs are sensitive to how we phrase prompts
- Small changes in wording can lead to different outputs
- Helps control style, tone, and information retrieval
- Useful for tasks like summarization, translation, and text generation

Example: prompt sensitivity

- *Explain the meaning of "syntax".*
- *Explain "syntax" to a 5-year-old.*
- *Explain "syntax" using a cooking analogy.*
- *Explain "syntax" using topology.*
- The way we phrase our request changes the response!

Types of prompting

- Zero-shot prompting: Asking a question without providing examples.
- Few-shot prompting: Giving a few examples before asking the model to continue.
- Chain-of-thought prompting: Encouraging step-by-step reasoning.

System prompt vs. user prompt

- System prompt (pre-set instructions)
  - Controls the model's behavior globally.
  - Example: *"You are a helpful assistant that answers concisely."*
- User prompt (dynamic input)
  - Direct request from the user.
  - Example: *"Summarize this article in one sentence."*

Understanding context window

- The maximum amount of text an LLM can consider at once
- Older parts of the conversation may be forgotten if too long

Effective prompting strategies

1. Be specific and clear
   - Vague: *Explain phonetics.*
   - Better: *Explain phonetics with examples of English sounds.*
2. Use explicit instructions
   - Instead of *Summarize this*, try *Summarize this article in 3 bullet points*.
3. Guide the output format
   - Example: *List the pros and cons of LLMs in a table.*
4. Use step-by-step reasoning
   - Example: *Explain the process of word formation step by step.*

Using GPT-4o in the tutorial

- I have built a web interface using my MS Azure OpenAI API key.
- This will grant you access to GPT-4o during the tutorial.
- **The API has a rate limit and may crash if all students use it simultaneously. If you have access to LLMs, I'd appreciate it if you used your own.**
- This access is only for our tutorial session. I will shut it down right after class.
- If you want to practice outside of class, you should obtain access to an LLM yourself.
- Please do not overuse it, as excessive usage costs me money.
- Please do not misuse it (e.g., by asking NSFW questions), as this could get my account blocked by Microsoft.
- **Do not share this access with others.**

Task 1: Machine translation with LLMs

- Translate an English text into both colloquial Cantonese and Classical Chinese.
- If you do not read Chinese, feel free to try this out in some other languages that you know!
- Your task is:
  - Translate into:
    - Colloquial Cantonese
    - Classical Chinese
  - Ensure both translations maintain meaning and fit their respective styles.
  - Moreover, try translating the text in a way as if a specific figure is uttering the speech:
    - A Hong Kong taxi driver talking to his/her passenger
    - An ancient Chinese scholar/poet (e.g., Qu Yuan)
    - If you only know English, how about William Shakespeare?

Task 2: Academic paper summarization

- Summarize an academic paper while adapting the summary for different fields.
- Your task is:
  - Generate a concise, accurate summary of the given paper.
  - Adapt the summary for different academic audiences, such as linguistics majors, psychology majors, English majors, mathematics majors, computer science majors, etc.
    - Think about this: are the audiences undergraduate or postgraduate?
  - Ensure each summary aligns with the audience's background knowledge.
- Also, try to determine the best way for LLMs to present the summary: in a paragraph, in slides, or presentation style?

Task 3: Reverse engineering a prompt

- Given an LLM-generated response, reconstruct the most likely prompt!
- Challenge:
  - You will receive a response from the model.
  - Your task is to infer the prompt that likely generated it.
  - Then, modify the prompt to:
    - Produce a more detailed response.
    - Change the response style (e.g., more formal, more concise).
- Discussion:
  - How do slight changes in wording affect the response?

Prompt #1

- You are an undergraduate student at the Chinese University of Hong Kong. Explain to your 50-year-old mom why the sky looks blue in a way that a 5-year-old can understand. Consider: (1) that you live in Hong Kong, (2) how to simplify the explanation for a young child, and (3) that you are speaking to your mom.

Prompt #2

- You are a house cat living in a high-rise apartment in Hong Kong. Write a diary entry about your daily struggles, including your thoughts on your owner's obsession with AI chatbots and why you think humans are weird.

Prompt #3

- You are a bad-tempered but secretly caring TA for an Introduction to NLP course at a university. Your students are linguistics majors with no background in computer science or math, and they are struggling to understand the Transformer architecture. In 200 words, explain Transformers in a way that they will understand. Your tone should be grumpy, impatient, but ultimately helpful—like a TA who is frustrated but still wants their students to succeed.

Prompt #4

- Write a ridiculously overcomplicated Python program that uses a variety of sorting algorithms, recursion, randomization, and unnecessary data structures, but in the end, all it does is print: "Your TA is very proud of you!"
  Make the code as tedious and excessive as possible, but ensure it still runs correctly. Please only output the code with no description.

Miscellaneous

- **No class next week (reading week)**
- **Midterm: March 12, in class**
- Please do not hesitate to ask questions
- We enjoy feedback from you, so please let us know if you feel there's anything we could have done better
- It would be great if you'd bring your laptop to the class every week