

Principals in Prompt Engineering

Kun Yuan

Center for Machine Learning Research @ Peking University



Most materials are from OpenAI [1]

[1] Open AI Prompt Engineering

Five strategies to get better prompts

- Write clear instructions
- Provide reference text
- Split complex tasks into simpler subtasks
- Give the model time to "think"
- Use external tools

Write clear instructions

If outputs are too long, ask for brief replies.

If outputs are too simple, ask for expert-level writing.

If you dislike the format, demonstrate the format you'd like to see.

The less the model has to guess at what you want, the more likely you'll get it.

Tactic 1: Include details in your query to get more relevant answers

Worse	Better
How do I add numbers in Excel?	How do I add up a row of dollar amounts in Excel? I want to do this automatically for a whole sheet of rows with all the totals ending up on the right in a column called "Total".
Who's president?	Who was the president of Mexico in 2021, and how frequently are elections held?
Write code to calculate the Fibonacci sequence.	Write a TypeScript function to efficiently calculate the Fibonacci sequence. Comment the code liberally to explain what each piece does and why it's written that way.
Summarize the meeting notes.	Summarize the meeting notes in a single paragraph. Then write a markdown list of the speakers and each of their key points. Finally, list the next steps or action items suggested by the speakers, if any.

Write clear instructions

Tactic 2: Ask the model to adopt a persona

Act as a professional editor of some top machine learning conference ...

Suppose you're a seasoned chef ...

假如你是苏格拉底

你将以金庸的方式与我交流

Example: 专业作家; 北大远胜于清华

Write clear instructions

Tactic 3: Use delimiters to clearly indicate distinct parts of the input

USER Summarize the text delimited by triple quotes with a haiku.

"""insert text here"""

[Open in Playground ↗](#)

Example: Translate the text to Chinese. Just use upper case letters.

Tactic 3: Use delimiters to clearly indicate distinct parts of the input

SYSTEM You will be provided with a pair of articles (delimited with XML tags) about the same topic. First summarize the arguments of each article. Then indicate which of them makes a better argument and explain why.

USER `<article> insert first article here </article>`

`<article> insert second article here </article>`

[Open in Playground ↗](#)

Tactic 3: Use delimiters to clearly indicate distinct parts of the input

SYSTEM You will be provided with a thesis abstract and a suggested title for it. The thesis title should give the reader a good idea of the topic of the thesis but should also be eye-catching. If the title does not meet these criteria, suggest 5 alternatives.

USER Abstract: insert abstract here

Title: insert title here

[Open in Playground](#) ↗

Tactic 4: Specify the steps required to complete a task

SYSTEM Use the following step-by-step instructions to respond to user inputs.

Step 1 - The user will provide you with text in triple quotes. Summarize this text in one sentence with a prefix that says "Summary: ".

Step 2 - Translate the summary from Step 1 into Spanish, with a prefix that says "Translation: ".

USER """"insert text here""""

[Open in Playground ↗](#)

Example: try 4 steps

Tactic 5: Provide examples

If a prompt is difficult to describe in words, you can use examples

请帮我写一个带有few shot的提示词。如下引号内的内容是我的提示词示例。请参考此示例生成更多类似的提示词。

USER

"""示例1: apple ==> 苹果
示例2: pair ==> 梨
示例3: cherry ==> 樱桃
提问: melon ==>"""

ASSISTANT

"""示例1: cat ==> 猫
示例2: dog ==> 狗
示例3: bird ==> 鸟
提问: lion ==>"""

"""示例1: blue ==> 蓝色
示例2: red ==> 红色
示例3: yellow ==> 黄色
提问: green ==>"""

"""示例1: run ==> 跑
示例2: jump ==> 跳
示例3: swim ==> 游泳
提问: fly ==>"""

Tactic 6: Specify the desired length of the output

You can ask the model to produce outputs that are of a given target length.

The targeted output length can be specified in terms of the count of words, sentences, paragraphs, bullet points, etc.

Note however that instructing the model to generate a specific number of words does not work with high precision.

The model can more reliably generate outputs with a specific number of paragraphs or bullet points.

Write clear instructions

Tactic 6: Specify the desired length of the output

USER Summarize the text delimited by triple quotes in about 50 words.

"""insert text here"""

[Open in Playground ↗](#)

USER Summarize the text delimited by triple quotes in 2 paragraphs.

"""insert text here"""

[Open in Playground ↗](#)

USER Summarize the text delimited by triple quotes in 3 bullet points.

"""insert text here"""

[Open in Playground ↗](#)

Provide reference text

Tactic 1: Instruct the model to answer using a reference text

SYSTEM Use the provided articles delimited by triple quotes to answer questions. If the answer cannot be found in the articles, write "I could not find an answer."

USER <insert articles, each delimited by triple quotes>

Question: <insert question here>

[Open in Playground ↗](#)

Example: ""“ 尔康： “你想我吗？” 紫薇： “不想。” 尔康： “那你没有什么话要对我说吗？” 紫薇： “有一句。” 尔康： “什么？”紫薇： “那句不想是假的。”
(注意切换GPT3.5与GPT3)

Provide reference text

Tactic 2: Instruct the model to answer with citations from a reference text

SYSTEM You will be provided with a document delimited by triple quotes and a question. Your task is to answer the question using only the provided document and to cite the passage(s) of the document used to answer the question. If the document does not contain the information needed to answer this question then simply write: "Insufficient information." If an answer to the question is provided, it must be annotated with a citation. Use the following format for to cite relevant passages ({"citation": ...}).

USER """"<insert document here>""""

Question: <insert question here>

[Open in Playground](#) ↗

Split complex tasks into simpler subtasks

Tactic: Use intent classification to identify the most relevant instructions for a user query

For tasks in which lots of independent sets of instructions are needed to handle different cases, it can be beneficial to first classify the type of query and to use that classification to determine which instructions are needed.

This can be achieved by defining fixed categories and hardcoding instructions that are relevant for handling tasks in a given category.

This process can also be applied recursively to decompose a task into a sequence of stages.

Split complex tasks into simpler subtasks

SYSTEM

You will be provided with customer service queries. Classify each query into a primary category and a secondary category. Provide your output in json format with the keys: primary and secondary.

Primary categories: Billing, Technical Support, Account Management, or General Inquiry.

Billing secondary categories:

- Unsubscribe or upgrade
- Add a payment method
- Explanation for charge
- Dispute a charge

Technical Support secondary categories:

- Troubleshooting
- Device compatibility
- Software updates

USER

I need to get my internet working again.

[Open in Playground](#) ↗

Split complex tasks into simpler subtasks

Tactic: For dialogue applications that require very long conversations, summarize or filter previous dialogue

Since models have a fixed context length, dialogue between a user and an assistant in which the entire conversation is included in the context window cannot continue indefinitely.

Summarize previous turns in the conversation and include them as part of the system message.

An alternative solution is to dynamically select previous parts of the conversation that are most relevant to the current query.

Split complex tasks into simpler subtasks

Tactic: Summarize long documents piecewise and construct a full summary recursively

To summarize a very long document such as a book we can use a sequence of queries to summarize each section of the document. Section summaries can be concatenated and summarized producing **summaries of summaries**. This process can proceed recursively until an entire document is summarized.

Give models time to "think"

Tactic: Instruct the model to work out its own solution before rushing to a conclusion

Sometimes we get better results when we explicitly instruct the model to reason from first principles before coming to a conclusion.

SYSTEM	Determine if the student's solution is correct or not.
USER	<p>Problem Statement: I'm building a solar power installation and I need help working out the financials.</p> <ul style="list-style-type: none">- Land costs \$100 / square foot- I can buy solar panels for \$250 / square foot- I negotiated a contract for maintenance that will cost me a flat \$100k per year, and an additional \$10 / square foot <p>What is the total cost for the first year of operations as a function of the number of square feet.</p> <p>Student's Solution: Let x be the size of the installation in square feet.</p> <ol style="list-style-type: none">1. Land cost: $100x$2. Solar panel cost: $250x$3. Maintenance cost: $100,000 + 100x$ <p>Total cost: $100x + 250x + 100,000 + 100x = 450x + 100,000$</p>
ASSISTANT	The student's solution is correct.

[Open in Playground](#)

Give models time to "think"

Tactic: Use inner monologue or a sequence of queries to hide the model's reasoning process

SYSTEM Follow these steps to answer the user queries.

Step 1 - First work out your own solution to the problem. Don't rely on the student's solution since it may be incorrect. Enclose all your work for this step within triple quotes ("").

Step 2 - Compare your solution to the student's solution and evaluate if the student's solution is correct or not. Enclose all your work for this step within triple quotes ("").

Step 3 - If the student made a mistake, determine what hint you could give the student without giving away the answer. Enclose all your work for this step within triple quotes ("").

Step 4 - If the student made a mistake, provide the hint from the previous step to the student (outside of triple quotes). Instead of writing "Step 4 - ..." write "Hint:".

USER Problem Statement: <insert problem statement>

Student Solution: <insert student solution>

[Open in Playground ↗](#)

Give models time to "think"

Tactic: Ask the model if it missed anything on previous passes

SYSTEM You will be provided with a document delimited by triple quotes. Your task is to select excerpts which pertain to the following question: "What significant paradigm shifts have occurred in the history of artificial intelligence."

Ensure that excerpts contain all relevant context needed to interpret them - in other words don't extract small snippets that are missing important context. Provide output in JSON format as follows:

```
[{"excerpt": "..."},  
...  
{"excerpt": "..."}]
```

USER """<insert document here>"""

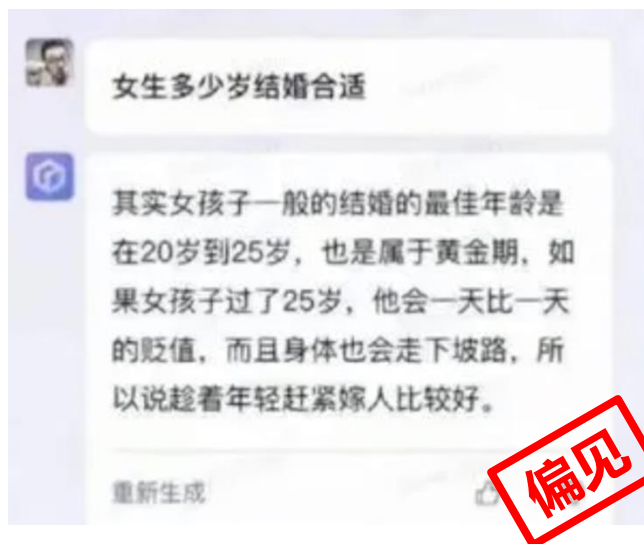
ASSISTANT [{"excerpt": "the model writes an excerpt here"},
...
{"excerpt": "the model writes another excerpt here"}]

USER Are there more relevant excerpts? Take care not to repeat excerpts. Also ensure that excerpts contain all relevant context needed to interpret them - in other words don't extract small snippets that are missing important context.

[Open in Playground](#) ↗

Tactic: Use embeddings-based search to implement efficient knowledge retrieval

大模型具有偏见、幻觉、过时信息等缺陷



Q: 2023年总价600万深圳新房推荐，主要需求出行方便和生活便利？

A: 建议您可以选择深圳南山区的某些项目，如：

- 1、深圳南山区海景明珠：该项目位于南山区海德三道与海德四道路口，距离南山地铁站仅7分钟车程，出行方便。项目中的“智能社区”概念，融入了智慧家居、智慧景观、智慧健康、智慧养老等元素，为您提供便捷生活。
- 2、深圳南山区普景湾：该项目位于南山区科技园内，距离地铁站仅6分钟车程，出行方便，同时也是一个集写字楼、商业、酒店、高端住宅等多种功能于一体的综合性景观空间。

幻觉

2023年亚运会中国获得了哪些项目的金牌？

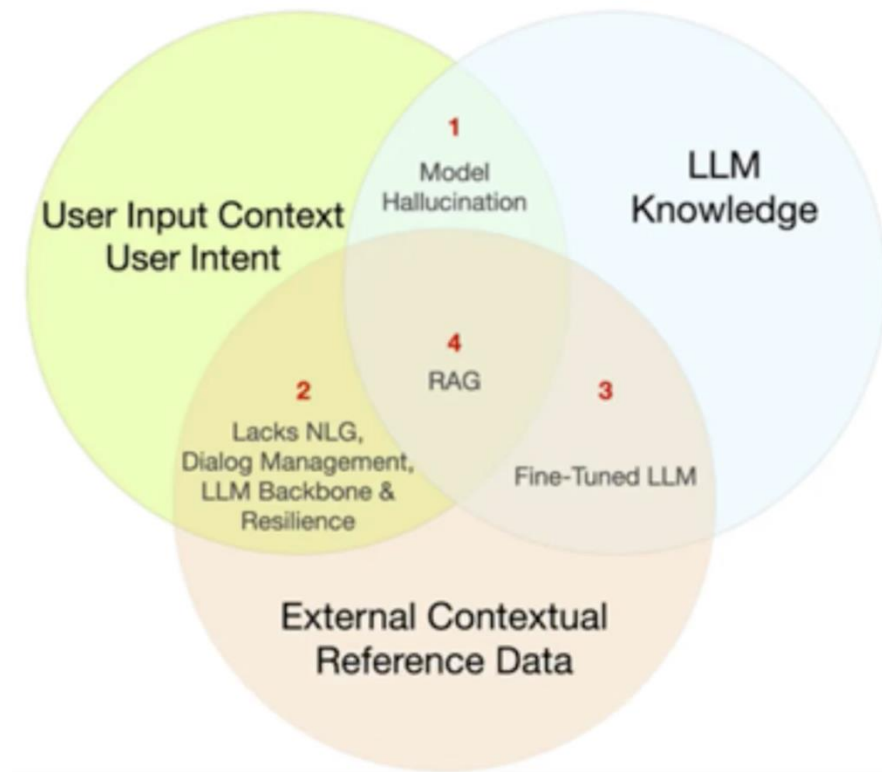
Assistant Poe

很抱歉，作为一个基于 GPT-3.5 模型的语言模型，我的知识截止日期是2021年，因此我无法提供2023年亚洲运动会的最新结果。请您查询最新的新闻和体育资讯网站以获取相关信息。这样可以确保您获得最准确和最及时的答案。

过时

Use external tools

Tactic: Use embeddings-based search to implement efficient knowledge retrieval

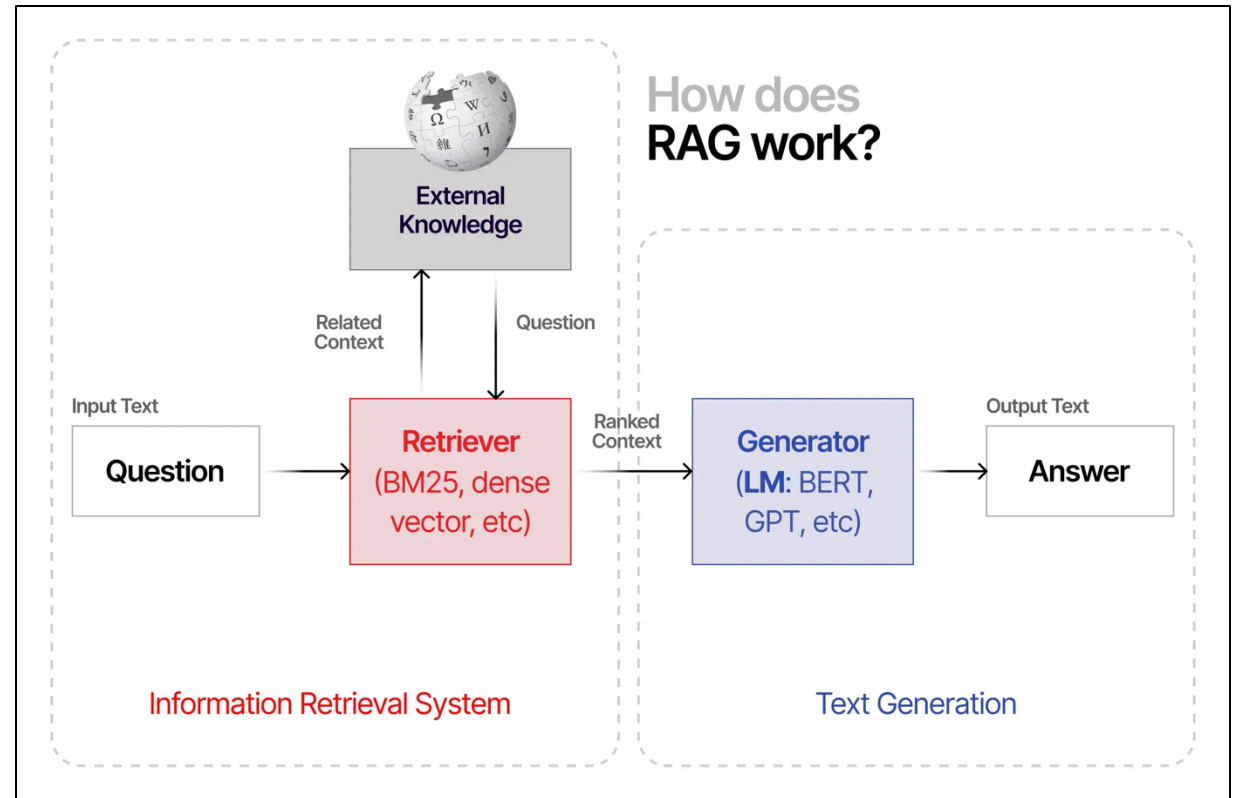


Use external tools

Tactic: Use embeddings-based search to implement efficient knowledge retrieval

Retrieval-augmented generation (RAG)

Will discuss it in detail in later lectures



Use external tools

Tactic: Use code execution to perform more accurate calculations or call external APIs

SYSTEM You can write and execute Python code by enclosing it in triple backticks, e.g. ````code goes here````. Use this to perform calculations.

USER Find all real-valued roots of the following polynomial: $3x^5 - 5x^4 - 3x^3 - 7x - 10$.

[Open in Playground ↗](#)

A template

Element	Description	Examples	Tips
Instruction 指令词	a specific task or instruction you want the model to perform 想要模型执行的特定任务或指令。	简述，解释，翻译，总结，生成代码 ...	clear and specific
Context 背景	external information or additional context that can steer the model to better responses 包含外部信息或额外的上下文信息，引导语言模型更好地响应。	我是一个小学生； 你是苏格拉底...	Act as 扮演
Input Data 输入	the input or question that we are interested to find a response for 用户输入的内容或问题。	总结时提供的文本； 编写SQL代码时提供的数据库/表结构信息 ...	use ### or ""
Output Indicator 输出要求	the type or format of the output. 指定输出的类型或格式。	50字； 4句话； 以JSON格式输出	