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Introduction to Artificial Intelligence

Chapter 07

Prompt Engineering Techniques for LLMs

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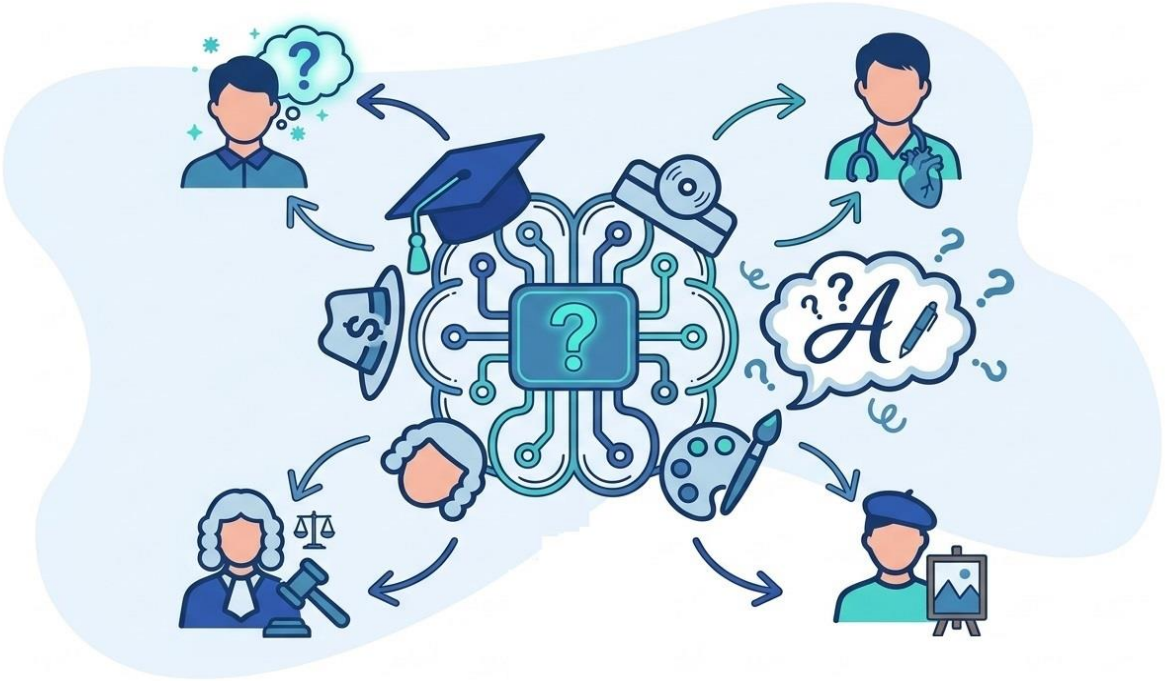
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01 – Role-Based Prompting

What are Role-Based Prompts?

It is one of prompt engineering techniques, where AI is directed to play a specific role or character, which effects its tone, style, and content of response, making it more relevant, specialized, and context-aware.



- **Examples:**

Prompt: "You are a math teacher explaining algebra to a 10-year-old. Make it simple and engaging.“

Response: "Hello! Think of algebra like being a math detective. Usually, in math, we say something like 5 + 5 = 10. But in algebra, someone has stolen one of the numbers and replaced it with a hidden treasure box...“

- **Examples:**

Prompt: "Put on the role of a customer service representative. Respond empathetically to a complaint about a delayed order.“

Response: "I sincerely apologize for the delay in your order. I understand how frustrating it can be to wait for something you're eager to receive, especially when it's expected to arrive by a specific date..."

Benefits of Role-Based Prompting:

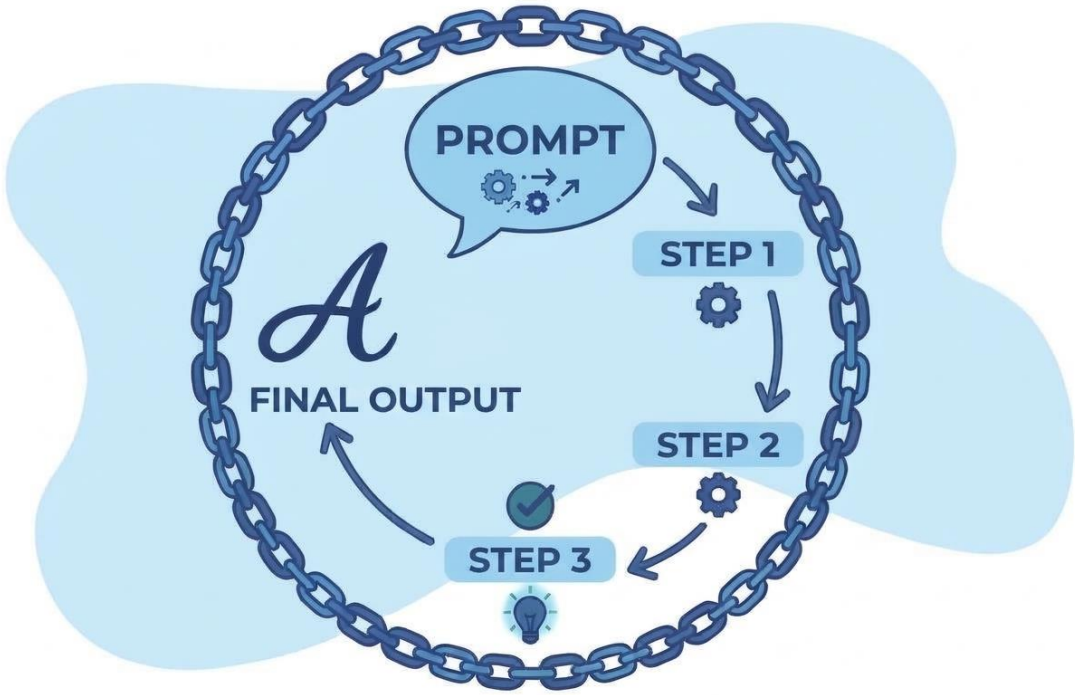
Role-based prompts improve the quality of responses by directing AI to think from specific perspective, resulting in more accurate and engaging outcomes. Benefits include:

- Making responses clearer and more contextually relevant.
- Enabling AI to simulate expert roles for more specialized answers.
- Support creativity in tasks such as storytelling or role-playing.
- Enhancing interaction by aligning tone and style with the situation.

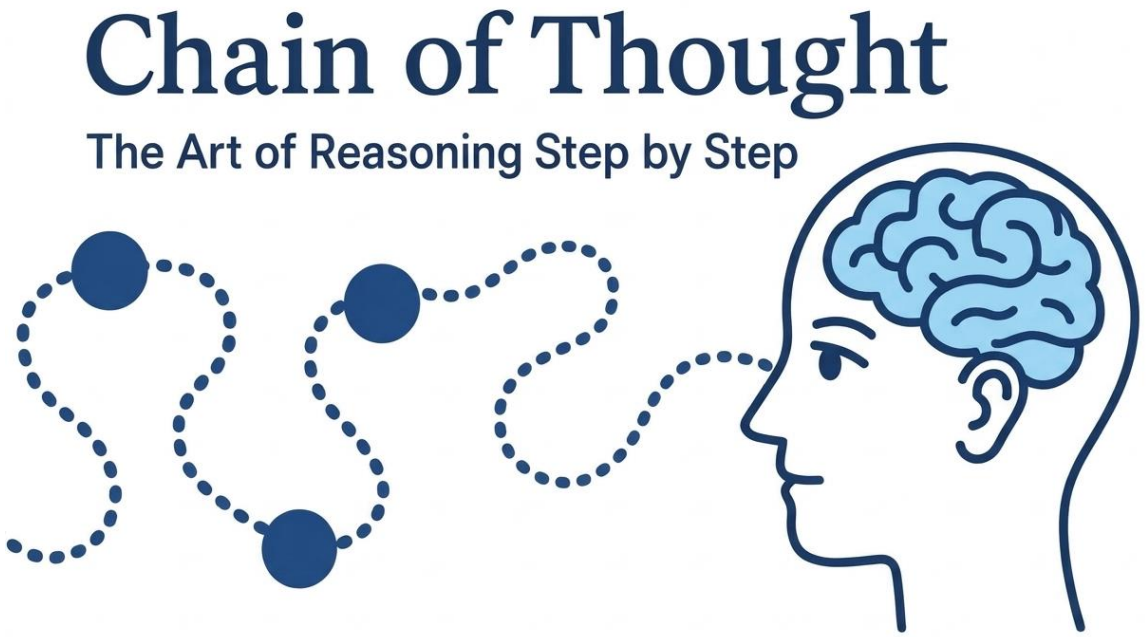
02 – Chain-of-Thought Prompting

What are Chain-of-Thought Prompts?

It is one of prompt engineering techniques, where a model generate a step-by-step explanations or reasoning before arriving to the final answer.
This helps make the output more accurate, clear, and reliable.



This technique solves problems through structured, step-by-step reasoning rather than generating a direct answer. The model interprets the input, breaks it down into logical steps, and then produces the final output after processing.



- **Examples:**

The prompt without using chain-of-thought:

Prompt: "I went to the market and bought ten apples. I gave two apples to my neighbors and two apples to the worker. Then I went and bought five more apples and ate one. How many apples did I have left? "

Response: "11 apples." Incorrect

- **Examples:**

The prompt using chain-of-thought:

Prompt: " I went to the market and bought ten apples. I gave two apples to my neighbors and two apples to the worker. Then I went and bought five more apples and ate one. How many apples did I have left? Let's think step by step."

Response: "First, you had ten apples. You gave two apples to your neighbors and two apples to the worker, so you had six apples left. Then you bought five more apples, so you had eleven apples. Finally, you ate one apple, so you had ten apples left." Correct

Benefits of Chain-of-Thoughts Prompting:

Chain-of-Thought prompting offers numerous benefits, particularly in improving the performance and reliability of language models in complex tasks. Among these benefits are:

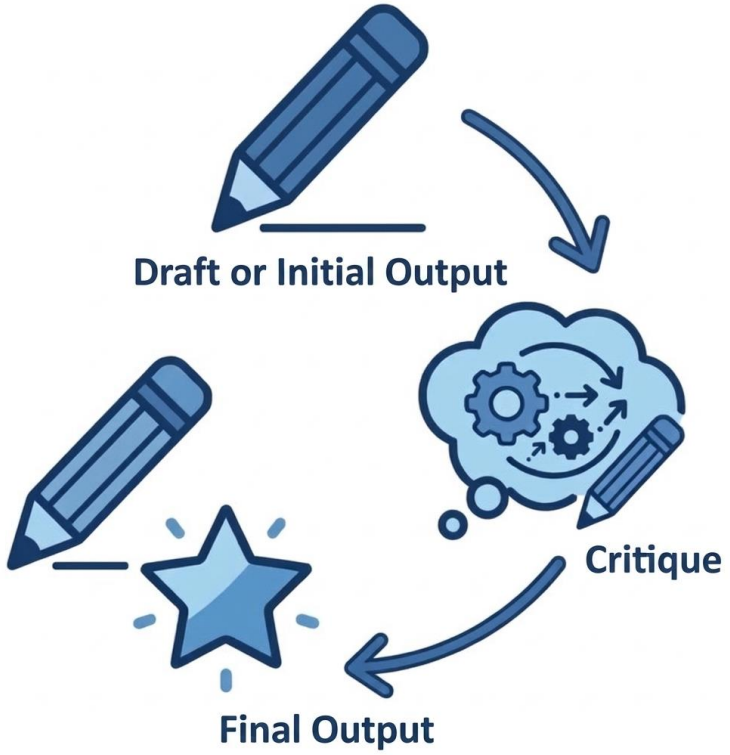
- By focusing on intermediate steps, the model can reduce errors and deliver more accurate results.
- The transparency provided by the chain of reasoning helps users understand the logic behind the model's output.
- It enhances the model's ability to handle tasks requiring multi-step reasoning, including computational operations.

03 – Self-Refine Prompting

What are Self-Refine Prompts?

It is one of prompt engineering techniques, where the model acts as both author and critic. This technique demand from the AI to create a draft, evaluate it according to predefined quality criteria, and finally deliver an improved final output.

This cycle reveals errors and gaps that the AI might miss when tasked with producing a direct final answer.



- **Examples:**

Prompt:
Step 1: Write an initial draft about prompt engineering.
Step 2: Review your draft. Identify three specific problems:
Something unclear,
Something missing,
Something incorrect or unhelpful.
Step 3: Rewrite the draft to correct these three problems. Submit only the final version.

These steps can be given in a single prompt or as a series of steps where each step represents a prompt.

Benefits of Self-Refine Prompting:

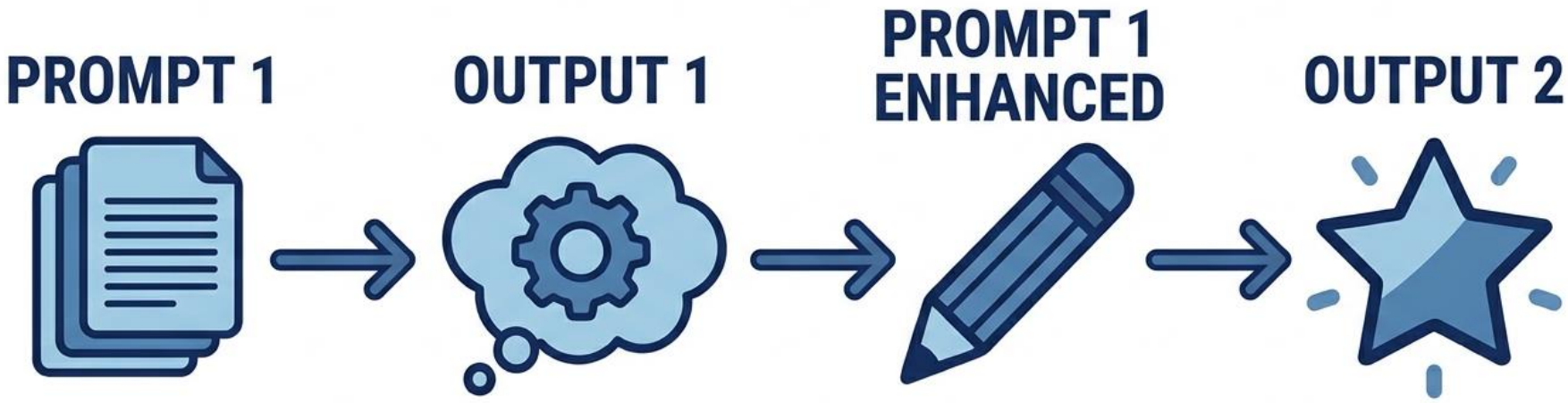
Self-Refine Prompting enhances AI output by having the model evaluate and revise its own initial draft. Its benefits includes:

- Improved clarity and readability, as the revision process eliminates vague language, repetition, and awkward structures, resulting in smoother text and clearer meaning.
- More task-relevant results, since revision criteria force the model to verify that it has indeed addressed the request, included the required elements, and matched the target audience.
- Reduced rework, as a single, well-designed cycle of drafting, critiquing, and revising can be more efficient than repeatedly rewriting instructions from scratch.

04 – Iterative-Refine Prompting

What are Iterative-Refine Prompts?

It is one of prompt engineering techniques, that involves systematically improving and modifying the prompts you provide to a generative AI tool to enhance the relevance, accuracy, and depth of its output. It is a dialogue where each response contributes to shaping the next question.



- **Examples:**

First prompt: "Explain the meaning of deep learning.“
Second prompt: "Explain the meaning of deep learning; make the answer clearer, but do not change the meaning.“
Third prompt: "Explain the meaning of deep learning; make the answer clearer, but do not change the meaning. Include two simple examples that align with the explanation.“

With each response, we observe and identify shortcomings in order to refine the subsequent question or prompt.

Benefits of Iterative-Refine Prompting:

The benefits of using iterative-Refine include:

- Improved accuracy by clarifying ambiguous instructions and reducing errors.
- Reduced confusion by maintaining factual consistency and minimizing irrelevant or incorrect responses.
- Domain and tone adaptation by tailoring responses to specific audiences, groups, or communication styles.

05 – Building Prompts Templates for Projects

Large language models help in planning and effectively completing projects using well-crafted prompts.
Since all projects follow the same steps, using prompt templates allows us to use a single, universal template applicable to all projects.

A prompt template for a project should contain the essential components of a good prompt: context, purpose, and explanation.
It should also include variable elements in their designated fields, such as: [Project Name], [Target Audience], etc.

Prompt engineering techniques such as role-based, self-refine, and iterative-refine prompts should also be employed.

A standardized Prompt template for all projects:

Role: You [Role].

Objective: To create [Outputs] for [Project Name].

Context:

- Project Purpose: [Purpose].
- Target Audience: [Target Audience].
- Basic Information: [Scope/Deadline/Team/Budget].
- Sources: [Paste Notes, Data, or Documents].

Task: [Step 1, Step 2, Step 3].

Constraints: [Set of restrictions, such as not fabricating any facts, names, or dates].

Output Format: [Output Format].

Quality Check: [Conditions or criteria for a good output, such as checking before completion whether the objective has been achieved].

Mini-Example: Writing a Promotional Email.

Role: Marketing Content Writer.

Objective: To create a promotional email for the opening of a new bookstore.

Context:

Project Purpose: To maintain contact with book lovers and inform them of a 20% discount for the opening.

Target Audience: Readers and students in the city.

Basic Information: Limited-time offer for 3 days / Discount applies to all paperback books.

Sources: Store name: "Alam Al-Sutur" (World of Lines), Location: City Center.

Task:

1. Craft an engaging email subject line.
2. Write the email body in an encouraging and concise style.
3. Clearly invite the reader to visit the store.

Restrictions: The email body should not exceed 100 words, and avoid a direct and intrusive advertising style.

Output Format: Email body divided into: Subject, Body, and Action Button.

Quality Check: Ensure the discount percentage and store location are clearly stated before sending the email.

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- GeeksforGeeks. Role-based Prompting.
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- Madaan, Aman, et al. 2023. Self-refine: Iterative refinement with self-feedback.
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