Generative AI & Large Language Models

Prompt Engineering – PART II

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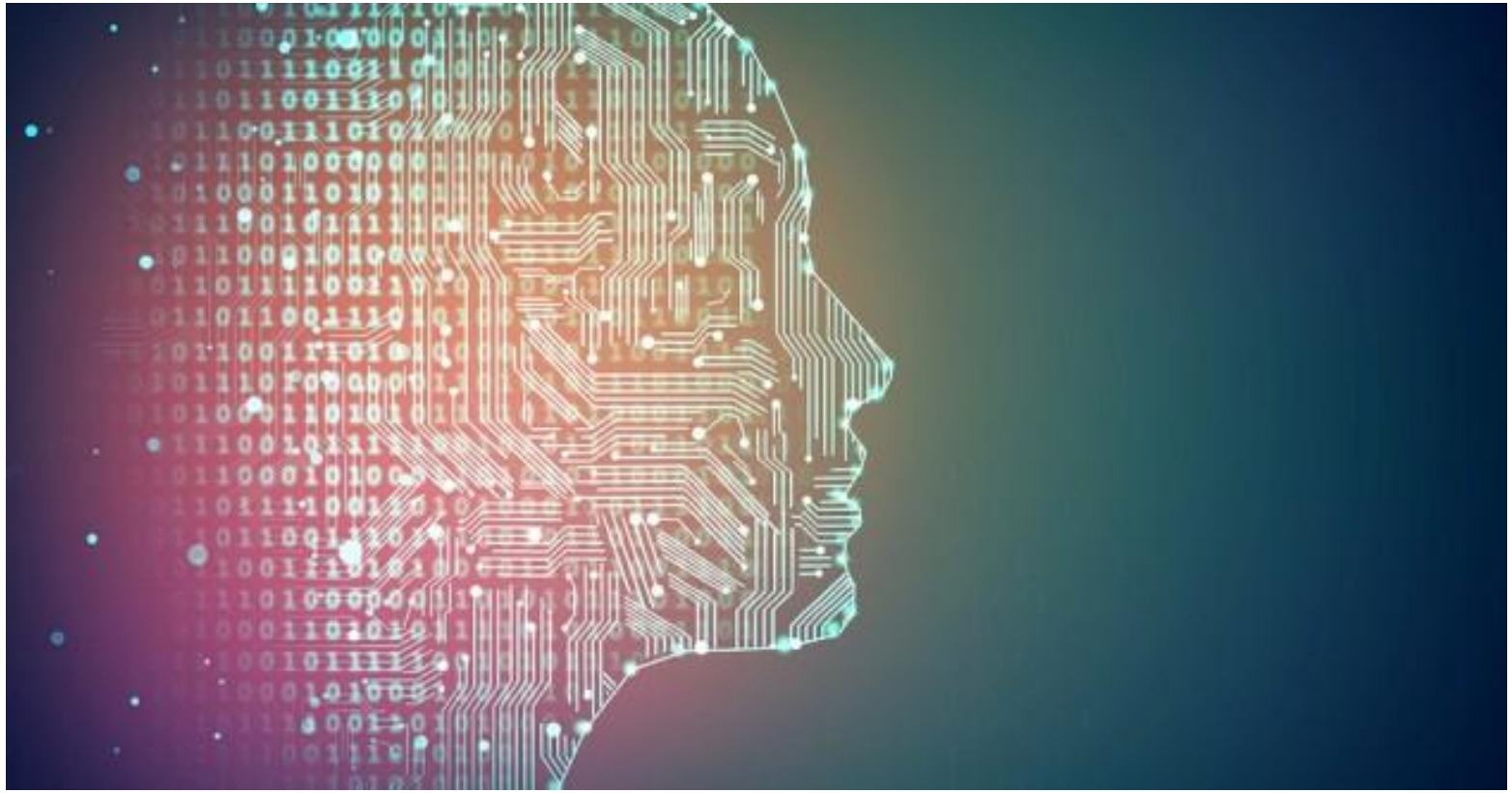
2: Generative AI & LLMs: Prompt Engineering



AI Deep learning (Source: mindovermachines.com)

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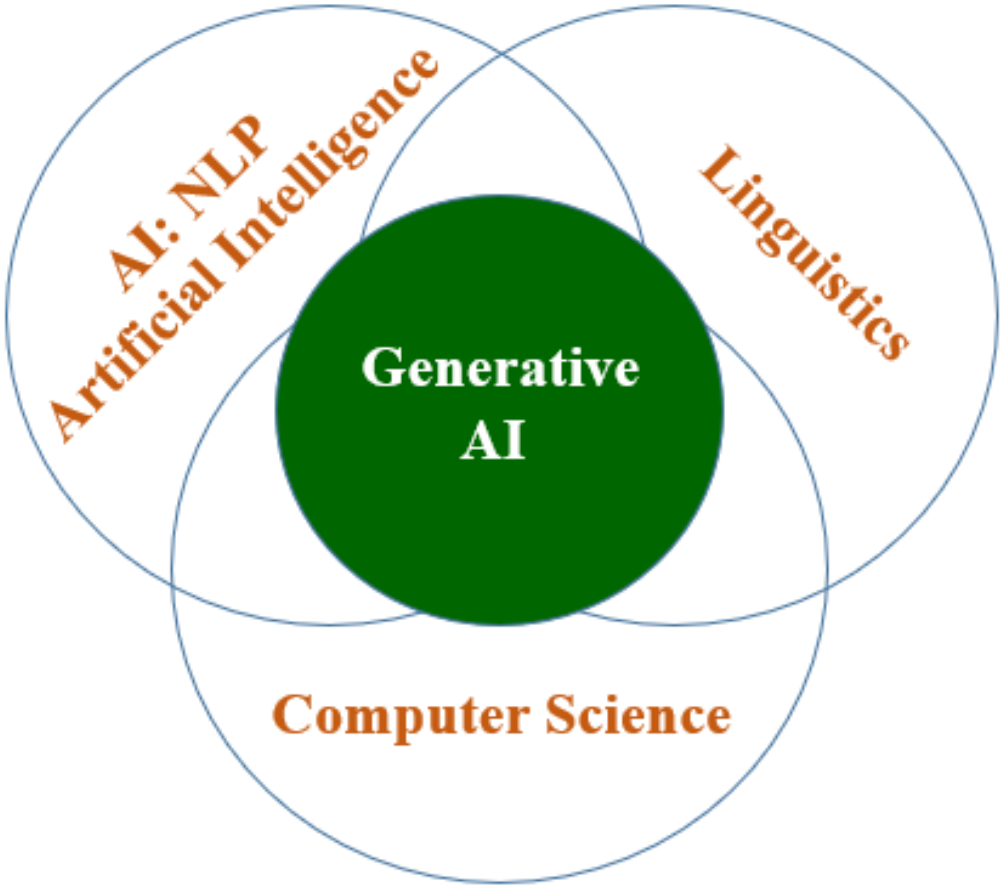
Generative AI & Large Language Models

Foundational Sciences & Technologies



Generative AI is based on the NLP technologies such as Natural Language Understanding (NLU) and Conversational AI (AI Dialogues) - Those among the most challenging tasks AI needs to solve.

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Prompt Engineering: Designing Prompts: Overview

- A well-designed prompt is not merely a question or a command.
- A well-designed prompt is a carefully constructed piece of communication that guides the LLM towards a specific goal.
- Similarly, a well-designed prompt to a generative AI user is like an architect's detailed blueprint to civil engineers and construction workers:
  - Ensuring they understand the architect's vision
  - Guiding them to build exactly what the architect has had in mind.

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Essential Elements of a well-designed prompt:

1. Clear and Specific Instructions
2. Context and Background Information
3. Examples (Few-Shot Learning)
4. Persona or Role Assignment
5. Constraints and Limitations
6. Iterative Refinement and Feedback

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Clear and Specific Instructions

What it is:

- The foundation of any effective prompt is a clear and specific instruction that explicitly states what you want the LLM to do.
- It's about being unambiguous and leaving no room for misinterpretation.
- The instruction acts as the primary directive, setting the stage for the entire interaction.

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Clear and Specific Instructions

How it should be designed:

- Use imperative verbs: Start your prompt with action verbs that clearly define the task. Examples: "Write," "Summarize," "Translate," "Explain," "Compare," "Generate," "Create," "Analyze."
- Be precise about the desired output format: Specify whether you want a poem, a list, an essay, a code snippet, a table, a dialogue, etc.
- Define the scope and constraints: If applicable, set boundaries for the task. For instance, specify a word limit, a particular style, a target audience, or a specific timeframe.

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Clear and Specific Instructions (Cont.)

How it should be designed (Cont.):

- Avoid ambiguity: Use language that is easy to understand and doesn't have multiple interpretations. Refrain from using jargon or overly complex sentence structures.

Example:

Instead of: "Tell me about climate change." (Vague)

Use: "Write a 500-word essay summarizing the main causes and consequences of climate change, targeting a high school audience." (Clear and Specific)

Explanation: The improved prompt provides a clear instruction ("Write"), specifies the output format ("essay"), defines the length ("500-word"), clarifies the topic ("causes and consequences of climate change"), and sets a constraint ("targeting a high school audience").

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Context and Background Information

What it is:

- Providing relevant context and background information helps the LLM understand the broader situation or scenario surrounding the task.

- It is like giving the model the necessary background knowledge to perform the task effectively. This is particularly crucial for complex or nuanced tasks.

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Context and Background Information

How it should be designed:

- Introduce the topic or scenario: Briefly explain the situation or problem that the prompt addresses.
- Provide relevant facts or data: If applicable, include specific information that the LLM should consider. This could be definitions, statistics, historical events, or any other pertinent details.
- Define key terms or concepts: If the prompt involves specialized terminology, ensure that the LLM understands their meaning.
- Set the stage for the task: Paint a picture of the context in which the task should be performed.

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Context and Background Information(Cont.)

Example 1:
Instead of: "Write a marketing email for a new product." (Lacks Context)

Use: "Imagine you are a marketing manager for a tech startup that has just launched a revolutionary new noise-canceling headphone called 'SilencePro.' Write a compelling email to potential customers, highlighting the key features and benefits of SilencePro, such as its superior noise cancellation technology, long battery life, and comfortable design. Emphasize that SilencePro is currently available for pre-order with a special discount." (Provides Context)

Explanation: The improved prompt sets the context by introducing the scenario (a tech startup launching a new product), providing relevant details (product name, features, benefits), and specifying the purpose of the email (to drive pre-orders).

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Context and Background Information(Cont.)

Example 2 (Few-Shot Learning):

What it is: Providing examples, also known as few-shot learning, is a powerful technique to guide the LLM towards the desired output format, style, and tone. It's like showing the model what you expect by demonstrating it through concrete examples.

How it should be designed:

- Choose representative examples: Select examples that accurately reflect the type of output you want.
- Provide a sufficient number of examples: Typically, 1-5 examples are enough to convey the pattern. More complex tasks might require more examples.
- Ensure consistency in format and style: The examples should be consistent with each other and with the desired output.
- Clearly delineate examples from instructions: Use clear separators or formatting to distinguish examples from the main instruction.

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Context and Background Information(Cont.)

Example 2 (Few-Shot Learning) (Cont.):

Example:
Prompt:
Here are a few examples of how to write a catchy tagline for a coffee shop:

Example 1:
Coffee Shop: The Daily Grind
Tagline: "Your daily dose of delicious."

Example 2:
Coffee Shop: Bean There, Drunk That
Tagline: "The perfect blend of coffee and community."

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Context and Background Information(Cont.)

Example 2 (Few-Shot Learning) (Cont.):

Example 3:
Coffee Shop: The Coffee Corner
Tagline: "Where every cup tells a story."

Now, write a catchy tagline for a new coffee shop called "The Roasted Bean."
Expected Output: (A tagline similar in style and tone to the provided examples, relevant to the name "The Roasted Bean.")

Explanation: The prompt provides three clear examples of coffee shop taglines, demonstrating the desired style and format. It then instructs the LLM to generate a similar tagline for a new coffee shop.

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Persona or Role Assignment

What it is:

- Assigning a specific persona or role to the LLM can significantly influence the tone, style, and perspective of the generated output.

- It is like asking the model to step into the shoes of a particular character or expert.

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Persona or Role Assignment (Cont.)

How it should be designed:

- Define length constraints: Specify a word limit, a character limit, or a desired range.
- Set stylistic constraints: Dictate the tone (e.g., formal, informal, humorous), the writing style (e.g., narrative, descriptive, persuasive), or the level of detail.
- Impose content constraints: Specify topics to avoid, keywords to include, or specific perspectives to adopt.
- Define format constraints: Indicate whether the output should be in paragraphs, bullet points, a table, or any other specific format.

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Persona or Role Assignment (Cont.)

Example:

Prompt: "Write a short product description for a new smartphone, highlighting its camera features. Limit the description to 100 words. Do not mention the price. Focus on the technical aspects of the camera, such as sensor size, aperture, and image stabilization."

Explanation: The prompt sets a length constraint ("100 words"), a content constraint ("Do not mention the price"), and a stylistic constraint ("Focus on the technical aspects of the camera").

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Iterative Refinement and Feedback

What it is:

- Prompt engineering is often an iterative process.

- It involves refining the prompt based on the initial output and providing feedback to the LLM to guide it closer to the desired result.

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Iterative Refinement and Feedback (Cont.)

How it should be designed:

- Evaluate the initial output: Analyze the LLM's response to assess whether it meets your expectations.
- Identify areas for improvement: Determine which aspects of the output need to be adjusted.
- Refine the prompt: Modify the instructions, context, examples, or constraints based on your evaluation.
- Provide feedback to the LLM: If the model allows for it, explicitly tell the LLM what you liked and disliked about the previous response and what you want to be changed.

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Prompt Engineering: Designing Prompts: Prompt Structures & Elements

Prompt Elements: Iterative Refinement and Feedback (Cont.)

Example:
Initial Prompt: "Write a story about a dog."

Initial Output: (A story that is too short and lacks detail)

Refined Prompt: "Write a detailed and descriptive story about a golden retriever named Buddy who gets lost in the city but eventually finds his way back home. The story should be at least 500 words long and focus on Buddy's adventures and the people he meets along the way. In your previous response, the story was too short. I want you to expand on Buddy's journey and describe his experiences in more detail. Also, add a bit more about the family that he eventually returns to."

Explanation: The refined prompt provides more specific instructions, sets a length constraint, adds more context, and provides feedback on the previous response to guide the LLM towards a more desirable output.

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Prompt Engineering: Designing Prompts: Step by Step

Step 1: Define the Objective

- What do you want the LLM to generate?
- What is the purpose of the output?
- Who is the target audience?

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Prompt Engineering: Designing Prompts: Step by Step

Step 2: Choose the prompt type

- Will you use zero-shot, few-shot, in-context learning, instruction-based prompting, role prompting, or any other prompt type, or a combination of these?

- Consider the complexity of the task and the capabilities of the LLM.

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Prompt Engineering: Designing Prompts: Step by Step

Step 3: Craft the instruction

- Start with a clear and specific imperative verb.
- Be precise about the desired output format.
- Define the scope and constraints.

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Prompt Engineering: Designing Prompts: Step by Step

Step 4: Provide context and background information

- Introduce the topic or scenario.
- Include relevant facts or data.
- Define key terms or concepts.

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Prompt Engineering: Designing Prompts: Step by Step

Step 5: Include examples (if applicable)

- Choose representative examples that demonstrate the desired output.
- Ensure consistency in format and style.
- Clearly delineate examples from instructions.

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Prompt Engineering: Designing Prompts: Step by Step

Step 6: Assign a persona (if applicable)

- Choose a relevant persona that aligns with the task.
- Define the persona's characteristics.
- Use language that reinforces the persona.

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Prompt Engineering: Designing Prompts: Step by Step

Step 7: Specify constraints and limitations

- Define length, stylistic, content, and format constraints.

Step 8: Test and refine

- Submit the prompt to the LLM and evaluate the output.
- Identify areas for improvement and refine the prompt accordingly.
- Provide feedback to the LLM if the platform allows.
- Iterate until you achieve the desired result.

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Prompt Engineering: Designing Prompts: Step by Step

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- Provide feedback to the LLM if the platform allows.
- Iterate until you achieve the desired result.

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Prompt Engineering: Designing Prompts: Step by Step: An Example

Example: Designing a Prompt for a Poem about the beauty of nature

Step 1: Objective:

Generate a poem that captures the beauty and serenity of nature, evoking a sense of peace and wonder. Target audience: general readership.

Step 2: Prompt type:

Combination of instruction prompting and role prompting.

Step 3: Instruction:

"Write a poem about the beauty of nature, focusing on imagery and sensory details. The poem should evoke a sense of peace and wonder."

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Prompt Engineering: Designing Prompts: Step by Step: An Example

Example: Designing a Prompt for a Poem about the beauty of nature (Cont.)

Step 4: Context:

"Imagine you are a poet who deeply appreciates the natural world. You are inspired by the sights, sounds, and smells of forests, mountains, and rivers."

Step 5: Examples:

(Optional) You could provide a few lines of poetry that exemplify the desired style and tone.

Step 6: Persona:

"You are a nature poet known for your evocative descriptions and ability to capture the essence of the natural world."

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Prompt Engineering: Designing Prompts: Step by Step: An Example

Example: Designing a Prompt for a Poem about the beauty of nature (Cont.)

Step 7: Constraints:

"The poem should be at least 16 lines long but no more than 24 lines. Use vivid imagery and sensory language."

Step 8: Test and refine:

- Submit the prompt and evaluate the output.
- If the poem is too abstract, you might refine the prompt to include specific natural elements like "trees," "birds," or "sunlight.“
- If the tone is not quite right, you might adjust the persona description or add more specific instructions about the desired mood.

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Prompt Engineering: Designing Prompts: Step by Step: An Example

Example: Designing a Prompt for a Poem about the beauty of nature (Cont.)

Final Prompt (after potential refinements):

"Imagine you are a nature poet known for your evocative descriptions and ability to capture the essence of the natural world. Write a poem about the beauty of nature, focusing on imagery and sensory details, specifically mentioning trees, birds, and sunlight. The poem should evoke a sense of peace and wonder. It should be at least 16 lines long but no more than 24 lines. Use vivid imagery and sensory language."

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Prompt Engineering: Designing Prompts: Step by Step: An Example

Example: Designing a Prompt for a Poem about the beauty of nature (Cont.)

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"Imagine you are a nature poet known for your evocative descriptions and ability to capture the essence of the natural world. Write a poem about the beauty of nature, focusing on imagery and sensory details, specifically mentioning trees, birds, and sunlight. The poem should evoke a sense of peace and wonder. It should be at least 16 lines long but no more than 24 lines. Use vivid imagery and sensory language."

Explanation: By following these steps and carefully considering each element, the user can craft well-designed prompts that harness the power of LLMs to generate creative, informative, and engaging content. Remember that prompt engineering is an iterative process, and practice makes perfect. The more the user experiments and refine the prompts, the better the user can communicate with these remarkable AI tools.