

INTRODUCTION TO PROMPT ENGINEERING

"From Questions to Clarity: Introduction to Prompt Engineering."



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WHAT IS PROMPT ENGINEERING

Prompt engineering refers to the process of designing and refining prompts or instructions given to artificial intelligence (AI) models to elicit specific desired outputs.

goal of prompt engineering is to ensure high quality responses from the AI models by providing explicit or implicit cues to guide their behavior.

AN EXAMPLE (CHATGPT)

Answer formats **vary**

(as LLMs are non-deterministic)

me	ChatGPT
What's $1 + 1$?	$1 + 1$ equals 2.
	$1 + 1$ equals to 2.
	The sum of $1 + 1$ is 2.
	$1 + 1$ still equals 2. This mathematical equation remains the same regardless of how many times it is asked.

me	ChatGPT
What's 1+1 stated as an integer?	1 + 1 stated as an integer is simply 2. In integer notation, we don't include any decimal or fractional parts, so the result remains 2. (a narrative answer)
What's 1+1? Only return the numeric answer.	2 (desirable output)

ENGINEERING THE QUESTION

ANOTHER EXAMPLE

File	Format	Size
2023 Q1	ZIP	53.11 MB
2022 Q4	ZIP	45.91 MB
2022 Q3	ZIP	45.16 MB
2022 Q2	ZIP	48.79 MB
2022 Q1	ZIP	52.61 MB

Given the following text, what is the file size for Q2 2022?

File
Format
Size
2023 Q1
ZIP
53.11 MB
2022 Q4
ZIP
45.91 MB
2022 Q3
ZIP
45.16 MB
2022 Q2
ZIP
48.79 MB
2022 Q1
ZIP
52.61 MB

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WHY PROMPTS IN LLMS

LLMs can be overly accurate (i.e., too much information), **inaccurate**, or **far too variable** for many commercial applications.

art of asking the right question, or prompt engineering

ENGINEERING THE QUESTION

me	ChatGPT
Given the following text, what is the file size for Q2 2022?	The file size for Q2 2022 is 48.79 MB.
Given the following text, what is the Q2 file size? Only return the answer.	48.79 MB
Given the following text, what is the Q2 file size in MB, don't include any text in the reply?	48.79

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WHY PROMPTS ARE IMPORTANT IN LARGE LANGUAGE MODELS (LLMs)



Prompts are **essential** in working with Large Language Models (LLMs) like OpenAI's GPT-3, GPT-4, and other transformer-based models.



A prompt is the **input** given to an LLM, **guiding** it to generate a response or perform a specific task.

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STEERING MODEL BEHAVIOR

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Prompts guide LLMs : generalized models trained on massive datasets; they rely on prompts to understand what task to perform. The same model can:

- Generate text.
- Answer questions.
- Perform translations.
- Summarize content, and more.

Example:

- **Prompt 1:** *Write a story about a brave knight.*
- **Prompt 2:** *Explain the concept of quantum computing.*
- Both elicit completely different behaviors from the same model.

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CONTEXT SETTING AND CLARIFICATION

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Context

- Prompts establish **context** for the model, helping it disambiguate the user's intent. They help the LLM understand the subject, tone, and format required for the response.
- If a task is complex, the prompt can specify step-by-step instructions or set boundaries for the response.

Example:

- **Prompt 1:** *Summarize the following paragraph in simple language.*
- **Prompt 2:** *Summarize the following paragraph for a scientific audience.*

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FLEXIBILITY WITHOUT FINE- TUNING

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By crafting varied prompts, you can make an LLM perform numerous tasks **without retraining or fine-tuning** the model. This makes prompts a **powerful interface** for task generalization.

Instead of training multiple models for specific tasks, a single LLM can be guided through different prompts to:

- Generate creative content.
- Answer technical questions.
- Provide conversational responses, etc.
- **Example:**
 - **Prompt 1:** *Translate this sentence into French.*
 - **Prompt 2:** *What is the capital of Japan?*
 - These two prompts trigger entirely different abilities in the model without needing any fine-tuning.




NATURAL LANGUAGE INTERFACING

- Prompts allow users to interact with LLMs using **natural language**, making these models accessible to non-experts. You don't need programming or machine learning expertise to get useful results.
- A user can phrase a request in everyday language, and the LLM will interpret it and return the desired output.
- **Example:**
 - You can simply type "*Generate a list of 5 healthy dinner recipes*" and get a valid, meaningful response from the LLM.



CONTROL OVER OUTPUT


- Prompts give control over
 - **Length** of the response (by specifying token limits).
 - **Creativity** of the response (using parameters like temperature, which controls randomness).
 - **Structure** of the response (providing formats like bullet points, lists, or paragraphs).
- **Example:**
- **Prompt 1:** *Generate a 2-paragraph summary of this document.*
- **Prompt 2:** *Generate 5 bullet points summarizing the key takeaways from this document.*



PROMPT AS A QUERY IN NLP

In many NLP tasks like question answering, summarization, or information retrieval, the prompt acts as the **query** that helps extract relevant information from the model's vast knowledge base.

- **Example:**
- **Prompt:** *What are the benefits of renewable energy?*
- The model responds by retrieving relevant information related to the query.



DYNAMIC AND ADAPTIVE RESPONSES

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Prompts enable **dynamic adaptation**, where users can **refine** and **adjust** them iteratively to improve the output.

This trial-and-error process helps optimize the interaction for better responses.

- **Example:**
- Start with: *"Explain the theory of relativity."*
- Refine it to: *"Explain the theory of relativity in simple terms for a 10-year-old."*

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EMERGENCE OF NEW CAPABILITIES


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LLMs exhibit **emergent capabilities** that can be achieved by **varying prompt** complexity and specificity.

Complex reasoning, code generation, and advanced comprehension emerge when the model is prompted with more detailed instructions.

- **Example:**
- Simple Prompt: *Translate this sentence.*
- Complex Prompt: *Translate this sentence, preserving the tone and formal register of the original text.*

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USE CASE

- **Text Generation**
 - **Prompt:** "Write a news headline about [topic]."
 - By providing a specific topic in the prompt, the AI model can generate a news headline that is focused and relevant to the given topic.
- **Creative Writing**
 - **Prompt:** "Write a short story about a [character] who embarks on a quest to find [object] in a [setting]."
 - This prompt guides the AI model to generate a creative story with specific characters, objects, and settings.



USE CASE

- **Product Descriptions**

- Prompt: "Describe the features and benefits of the [product]."
- By specifying the product in the prompt, the AI model can generate a descriptive text highlighting the unique features and advantages of the given product.

USE CASE

- **Question-Answering:**
- **Prompt:** "What is the capital of [country]?"
- By replacing [country] with the name of a specific country, the AI model can generate the corresponding capital as the answer.



- Simple Prompt Engg with Open AI LLM

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HAPPY LEARNING



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