Complex Tasks

In this resource, you'll build effective prompts for complex tasks. You'll learn the intricacies of crafting prompts that can elicit complex and meaningful responses from language models. Let's dive in!

Understanding Complex Tasks

Let's explore what makes a task complex and examine some real-world examples.

What are complex tasks?

Complex tasks involve multi-step reasoning, inference, or logical thinking. These tasks often require the language model to understand and process intricate instructions or input and generate responses demonstrating a high cognitive capability. Complex tasks go beyond simple factual queries and involve deeper understanding and problem-solving.

Here are some common examples of complex tasks, many of which you will have encountered at this point:

❖ **Language Translation:** Translating a paragraph or an entire document from one language to another is a complex task. It requires the language model to comprehend the nuances of the source language, understand the context, and generate a coherent and accurate translation in the target language.

❖ **Story Generation:** Prompting a language model to generate a creative and engaging story is a complex task. The model needs to develop a plot, create well-defined characters, and maintain consistency and coherence throughout the narrative.

❖ **Mathematical Problem-Solving:** Asking a language model to solve a complex mathematical equation or perform advanced calculations involves intricate reasoning and logical steps. The model needs to understand the mathematical concepts, apply appropriate algorithms, and generate the correct solution.

❖ **Legal Document Analysis:** Prompting a language model to analyze and extract information from legal documents, such as contracts or court rulings, is a complex task. It requires the model to comprehend legal terminology, interpret clauses, and identify relevant details accurately.

Challenges in Prompting for Complex Tasks:

Prompting for complex tasks poses several challenges that must be addressed for effective prompt engineering. Understanding these challenges and the nature of complex tasks will equip you with the knowledge necessary to design effective prompts that elicit the desired responses from language models.

Context Preservation
Complex tasks often involve a series of steps or sub-tasks. Maintaining and transferring context between prompts becomes crucial to ensure coherence and continuity in the language model's responses.
Ambiguity Handling
Complex tasks may involve ambiguous queries or require disambiguation of user input. Crafting prompts that provide sufficient clarity and guide the model to interpret the intended meaning is vital.
Task-Specific Constraints
Some complex tasks have specific constraints or requirements that must be taken into account when crafting prompts. These constraints could include limitations on the response length, adherence to specific formatting guidelines, or compliance with domain-specific rules.

Think about a complex task you have presented to Chat-GPT. Can you relate to the challenges? If you have not yet experimented with complex tasks, there's no time like the present!

Techniques for Crafting Effective Prompts

In this section, we will explore various techniques that can be employed to craft effective prompts for complex tasks. These techniques will help guide the language model through the intricacies of the task and elicit desired responses. Let's dive into the strategies and considerations for prompt engineering in complex tasks.

❖ Decomposition and Step-by-Step Approach:

One effective technique for addressing complex tasks is to break them down into smaller, more manageable sub-tasks. By decomposing the task, you can guide the language model through a step-by-step process, allowing it to focus on one aspect at a time. This approach facilitates better comprehension and response generation.

For example:

Prompt: "*Translate the following paragraph from English to French:*

Paragraph: '*Animals are fascinating creatures that inhabit our planet. They come in a wide variety of shapes, sizes, and colors. From the majestic lions roaming the savannah to the tiny hummingbirds fluttering their wings, each animal has its unique characteristics. Some animals, like the cheetah, are known for their incredible speed, allowing them to chase down their prey with lightning-fast agility. Others, such as the chameleon, have the remarkable ability to change their colors to blend into their surroundings. Animals play vital roles in our ecosystems, from pollinating plants to*

maintaining the balance of predator and prey. Understanding and appreciating the diversity of the animal kingdom can help us develop a deeper connection with the natural world.'"

In this example, decomposing the translation task into multiple prompts can help the language model generate accurate translations for each sentence, such as:

- Prompt 1: "Translate the sentence '*Animals are fascinating creatures that inhabit our planet.*'"
- Prompt 2: "*They come in a wide variety of shapes, sizes, and colors.*"

And so on till the entire paragraph is prompted onto the LLM. This will preserve the original tone and content and yield a near-perfect translation!

❖ Providing Contextual Information:

Complex tasks often require context to guide the language model in generating appropriate responses. By providing relevant background information, you can help the model understand the task's context and generate more accurate and context-aware responses. For instance:

Prompt: "*Write a creative story about a haunted house.*"

By providing additional context in the prompt, such as the location, time period, or specific characters, you can guide the language model to create a story that aligns with the desired theme or setting. **For example:**

Better prompt: "*Write a creative story about vampires residing in a haunted house set in Eastern Europe in the late 1940s.*"

❖ Specifying Desired Output Format:

For certain complex tasks, specifying the desired output format or structure in the prompt can be beneficial. This ensures that the language model generates responses that align with specific requirements. **For example:**

Prompt: "*Provide step-by-step instructions to solve the following quadratic equation:*

Equation: $x^2 + 5x + 6 = 0$"

By explicitly requesting step-by-step instructions and breaking it down to smaller problems, you can guide the language model to generate a response that breaks down the process of solving the equation, making it easier for users to follow.

❖ Handling Ambiguity and Edge Cases:

Complex tasks may involve ambiguous queries or edge cases that require careful consideration. Crafting prompts that anticipate potential ambiguities and provide additional clarification or constraints can help the language model generate more accurate responses. **For example:**

Prompt: "*Calculate the average income of the employees.*"

To handle ambiguity, you can specify the scope of the employees or the time frame, such as:

- Prompt 1: "Calculate the average income of full-time employees for the fiscal year 2022."
- Prompt 2: "Calculate the average income of part-time employees for the last quarter."

By addressing potential ambiguities, you can ensure that the language model understands the specific context and generates accurate responses.

These techniques will assist you in crafting effective prompts for complex tasks, allowing you to guide the language model towards generating more precise and meaningful responses. Experiment with different approaches and iterate based on evaluation and feedback to refine your prompt engineering skills.

Evaluating and Refining Complex Task Prompts

1. **Feedback Loop and Iterative Design:** We will emphasize the iterative nature of prompt engineering for complex tasks, where evaluation and refinement play a crucial role. We will discuss techniques for evaluating the quality and effectiveness of prompts and using the feedback loop to make iterative improvements.

2. **Analyzing and Adapting to Model Biases:** We will address the issue of model biases that may affect complex tasks and discuss strategies for mitigating biases through prompt design.

3. **Exploring Alternative Approaches:** We will encourage learners to think creatively and explore alternative prompt engineering approaches for complex tasks, such as using external knowledge sources, leveraging pre-training techniques, or applying transfer learning.

By applying the techniques and strategies discussed, you will be able to design prompts that guide language models in tackling intricate and challenging tasks. Now, it's time to put your skills into practice and witness the power of well-crafted prompts in unlocking the potential of language models.

Try out prompts on the below topics and analyze the challenges of complex tasks:

1. Try entering a long quadratic equation into Chat-GPT. Now, break it down into smaller problems and try using multiple prompts.
2. Try asking Chat-GPT to generate a poem while specifying a theme, poetry style and length of your choice. Now take the response and ask it to convert it to a language of your choice.