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Case Studies

The CLEAR path: A framework for enhancing information literacy through prompt engineering

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A B S T R A C T

This article introduces the CLEAR Framework for Prompt Engineering, designed to optimize interactions with AI language models like ChatGPT. The framework encompasses five core principles—Concise, Logical, Explicit, Adaptive, and Reflective—that facilitate more effective AI-generated content evaluation and creation. Additionally, the article discusses technical aspects of prompts, such as tokens, temperature, and top-p settings. By integrating the CLEAR Framework into information literacy instruction, academic librarians can empower students with critical thinking skills for the ChatGPT era and adapt to the rapidly evolving AI landscape in higher education.

Introduction

Rapid advances in artificial intelligence (AI) have had a substantial impact on a variety of industries, including education and information management. Particularly, generative AI, a subset of AI that centers on creating new content, has transformed the creation, sharing, and consumption of information. Students need to be taught how to communicate with AI language models like ChatGPT. These models are altering the information landscape, calling for fresh perspectives and methods in information literacy education.

To address this pressing need, the author developed the CLEAR Framework for Prompt Engineering, a concise and user-friendly method tailored to optimize interactions with generative AI language models, particularly for beginners. By utilizing the CLEAR framework — Concise, Logical, Explicit, Adaptive, and Reflective — students can learn to navigate and develop AI-generated content more effectively, thereby nurturing the critical thinking skills necessary for the ChatGPT era.

This article will discuss the CLEAR Framework, concentrating on its applicability to generative AI technologies and its practical applications. We will examine the technical aspects of the framework, such as crafting effective prompts for AI models, and investigate how academic librarians can incorporate this framework into information literacy education. Through this collaborative endeavor, we hope to equip academic librarians to adapt to the rapidly changing AI landscape and to prepare students for a future dominated by technologies powered by generative AI.

The CLEAR Framework for Prompt Engineering

Before getting into the CLEAR Framework, we must first understand the concept of prompt engineering. Prompt engineering is the process of constructing queries or inputs (i.e. prompts) for AI language models so as to elicit the most precise, coherent, and pertinent responses. In essence, it is the art of fine-tuning the questions or commands provided to AI models in order to optimize their performance and guarantee that they produce the desired results.

As AI language models such as ChatGPT advance in sophistication, the quality of their responses depends not only on the underlying algorithms and training data but also on the efficacy of the prompts they receive. A well-designed prompt can elicit a meaningful and informative response, whereas a poorly constructed one may result in outputs that are irrelevant or nonsensical.

Prompt engineering is an invaluable skill for academic librarians, as it enables them to utilize the maximum potential of AI language models for information literacy instruction. By understanding the principles of prompt engineering and mastering the art of formulating effective queries, librarians can ensure that AI-generated content is not only accurate and coherent but also pertinent to their students' particular needs and learning objectives.

The purpose of the CLEAR Framework for Prompt Engineering is to provide a standard method for composing effective queries for AI language models such as ChatGPT. This framework provides a comprehensive guide for maximizing the potential of AI-generated content in academic libraries by emphasizing five essential components: Concise, Logical, Explicit, Adaptive, and Reflective.

The development of the CLEAR Framework is predicated on the

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belief that well-designed prompts are necessary for enhancing the quality and relevance of AI-generated content. Each component of the CLEAR Framework addresses a particular aspect of prompt engineering, ensuring that users are equipped with a comprehensive set of techniques to optimize their interactions with AI language models. The framework's effectiveness stems from its capacity to systematically resolve the challenges commonly encountered when working with generative AI, such as producing coherent and context-appropriate responses.

The CLEAR Framework's five components

1. Concise: brevity and clarity in prompts

The first component of the CLEAR Framework emphasizes the importance of conciseness in crafting prompts. A concise prompt removes superfluous information, allowing AI language models to focus on the most important aspects of the task, resulting in more pertinent and precise responses. Clarity is also crucial, as unclear or imprecise instructions may result in AI-generated content that does not meet the user's needs or expectations. Writing effective prompts requires ensuring that the question is specific and directed toward the desired response.

Examples:

- Use a more concise and explicit prompt such as "Explain the process of photosynthesis and its significance" instead of "Can you provide me with a detailed explanation of the process of photosynthesis and its significance?"
- Instead of requesting, "Please provide me with an extensive discussion on the factors that contributed to the economic growth of China during the last few decades", use a concise prompt like, "Identify factors behind China's recent economic growth."

2. Logical: structured and coherent prompts

The second component, logical prompts, emphasizes the significance of sustaining a logical flow and order of ideas within a prompt. A logically structured prompt enables AI models to better comprehend the context and relationships between various concepts, resulting in more accurate and coherent outputs. To create a logical prompt, ensure that the provided information follows a natural progression and that the relationships between concepts are evident.

Example:

- "List the steps to write a research paper, beginning with selecting a topic and ending with proofreading the final draft" is a logically structured question.
- A logically structured prompt could be, "Describe the steps in the scientific method, starting with forming a hypothesis and ending with drawing conclusions."

3. Explicit: clear output specifications

The third component, explicit prompts, underscores the need for clear output specifications in the queries posed to AI language models. Explicit prompts provide precise instructions regarding the desired output format, content, or scope, thereby reducing the likelihood of receiving unanticipated or irrelevant responses from the AI model. Include specifics about the type of information you seek and how it should be conveyed to make a prompt explicit.

Examples:

- Instead of, "Tell me about the French Revolution," an explicit prompt would be, "Provide a concise overview of the French Revolution, emphasizing its causes, major events, and consequences."
- Rather than prompting, "What are some renewable energy sources?", opt for a more explicit version like, "Identify five renewable energy sources and explain how each works."

4. Adaptive: flexibility and customization in prompts

Adaptive prompts emphasize the significance of adaptability in prompt engineering. Adaptability entails experimenting with various prompt formulations, phrasings, and temperature settings in order to establish a balance between creativity and concentration. It also necessitates adapting the AI model's responses to the specific requirements of each mission. When crafting adaptive prompts, be flexible and willing to attempt new approaches based on the performance of the AI model.

Examples:

- If an initial prompt such as "Discuss the impact of social media on mental health" elicits responses that are too general, consider a more focused and adaptable prompt such as "Examine the relationship between social media usage and anxiety in adolescents."
- If asking, "What are some ways to conserve water?" leads to generic responses, try a more targeted and adaptive prompt like, "List household practices for conserving water and their potential impact."
- If a prompt such as, "Describe the history of computers" yields too much information, use a more specific and adaptive prompt like, "Explain the development of personal computers from the 1970s to the 1990s."

5. Reflective: continuous evaluation and improvement of prompts

Reflective prompts, the concluding element of the CLEAR Framework, emphasizes the significance of continuous evaluation in enhancing prompt engineering techniques. Adopting a reflective perspective enables users to evaluate the performance of their AI model based on user feedback and their own assessments, identifying areas for improvement and adjusting their approach accordingly. This mindset is vital for staying ahead of the curve and adapting to the ever-changing field of AI. Make it a habit, when using reflective prompts, to analyze AI-generated content and apply the insights obtained to future prompts.

Examples:

- After receiving AI-generated content on the benefits of a plant-based diet, evaluate the response's accuracy, relevance, and completeness. Use insights from the evaluation to refine future prompts, such as asking for more specific benefits or focusing on certain aspects of a plant-based diet.
- After acquiring an AI-generated list of strategies for effective time management, evaluate the relevance and applicability of each strategy. Consider the target audience's needs, and use this information to tailor future prompts to generate content that better addresses specific challenges or contexts.

The CLEAR Framework provides academic librarians and educators with an easy-to-remember approach to prompt engineering that facilitates efficient interaction with AI language models. By focusing on Concise, Logical, Explicit, Adaptive, and Reflective prompts, users can generate more accurate, relevant, and engaging AI-generated content that aligns with their objectives and needs. The CLEAR Framework enables librarians and educators to equip students with the required tools and techniques for maximizing the potential of AI language models, such as ChatGPT.

During library workshops on research skills or information literacy, for instance, librarians can use the CLEAR Framework to demonstrate how effective prompt engineering can enhance the quality of AI-generated summaries, analyses, and literature reviews. By instructing students on how to apply the CLEAR principles to their interactions with

AI models, librarians can help students develop critical thinking skills, improve their comprehension of AI-generated content, and optimize AI-based research processes. Incorporating the CLEAR Framework into academic library instruction also contributes to the development of information-literate students who are equipped to navigate the complexities of AI-driven technologies.

Technical aspects of prompts

Academic librarians must also be aware of the technical aspects of prompts that can influence AI-generated content in addition to the CLEAR principles. Among the most important technical factors are tokens, temperature, and top-p parameters.

- Tokens: tokens are the fundamental text elements processed by AI language models. A token can be as brief as one character or as long as one word in English. Since excessively long searches may result in incomplete or shortened responses, familiarity with the token constraints of AI models is key. By maintaining prompts within token limits, librarians can ensure that AI-generated content is exhaustive and pertinent to the current task.
- Temperature: the temperature setting in AI language models affects the randomness of the generated content. A lower temperature (e.g., 0.2) produces more focused and deterministic responses, whereas a higher temperature (e.g., 0.9) generates more inventive and diverse outputs. Academic librarians should experiment with different temperature settings to determine the optimal equilibrium between creativity and coherence in AI-generated content.
- Top-p: the top-p setting controls the level of randomness in the AI model's content generation by selecting the most probable tokens based on a given probability threshold. Depending on the specific requirements of a task, adjusting the value of top-p can facilitate a balance between focused and variegated responses.

As AI-generated content continues to permeate various academic disciplines, it is crucial for librarians to remain ahead of the curve and adapt their teaching strategies accordingly. By doing so, they can ensure that students are equipped to navigate the ever-changing information and technological landscape of the twenty-first century.

Call to action and conclusion

The CLEAR Framework's user-friendly approach to prompt engineering makes it a useful tool for librarians and educators. Keeping up with the ever-evolving digital landscape is an important consideration for us academic librarians, and it's imperative that we do so. Please consider the following call to action:

- Examine the CLEAR Framework: familiarize yourself with the CLEAR Framework and determine how it can be incorporated into your instruction on information literacy.
- Share and work together: discuss the CLEAR Framework with your coworkers and brainstorm ways to incorporate it into lesson plans, seminars, and other activities.
- Share your experiences and feedback with the broader academic community as you implement the CLEAR Framework in your information literacy instruction. This collaborative effort will enable the ongoing refinement of the framework and increase our understanding of how to optimally employ AI language models such as ChatGPT in education.

In conclusion, the CLEAR Framework offers academic librarians a valuable opportunity to enhance their instruction in information literacy and better prepare students for the challenges and opportunities presented by AI-generated content. By adopting this framework and engaging in a collaborative learning process, we can ensure that our students are equipped to navigate an ever-changing digital landscape and develop into critical thinkers in the ChatGPT era.

CRediT authorship contribution statement

Leo Lo is the sole author of the article, and is responsible for:

– Conceptualization
– Methodology
– Writing – original draft preparation
– Writing – reviewing and editing

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.