



Large Language Models



LLM and Prompt Engineering

- Discover how LLMs generate output
- Explore the role of prompt engineering
- How prompt engineering improve the quality of the output
- What can LLMs do



What is Prompt Engineering

- Is the practice of developing effective prompts that elicit useful output from generative AI
- **Key rule:** The clearer and more specific the prompts, the more likely you are to get useful output
- **Helpful tip:** Use iteration to evaluate the output and revising your prompts
- **Techniques:** Use techniques such as few-shot prompting
- **Required:** Critical thinking and creativity (a skill that can be practiced)



What is LLM

- An AI model that is trained on large amounts of text to identify patterns between words, concepts, and phrases so that it can generate responses to prompts.
- Popular examples are ChatGPT, Google Gemini, Microsoft CoPilot, Meta LLAMA, Anthropic Claude, and more ... (demo)



How does LLM work

- Identifies patterns in human languages
- Predict the word most likely to come next in a sequence of words (complete the sentence)
- Uses statistics to analyse the relationships between all the words in a given sequence
- Computes the probability for thousands of possible words to come next in that sequence
- The predictive power enables LLMs to response to question/requests whether to complete a simple sentence or to develop a compelling business strategy, or a persuasive new product launch or a creative ad campaign



LLM Limitations

- Although LLMs are powerful, you may not always get the output you want
- It may generate information that is skewed. For instance, the LLM is trained on bias data (e.g. websites, articles reflects unfair biases)
- Or it might not generate sufficient content about a specific domain or topic because the data it was trained on does not contain enough information about that topic
- Or it has the tendency to hallucinate – AI outputs that are not true. This means LLM can generate texts that are factually inaccurate
- The same prompt may not generate the same output in another instance
- Therefore, LLM, while a power AI tool, requires human guidance for effective use



Factors contributing to AI hallucination

- Quality of the LLM's training data
- Phrasing of the prompt
- Method an LLM uses
- One must verify the AI generate text to determine the quality of the output if it
 - Is factually accurate
 - Provides sufficient information
 - Relevant to the specific request
 - Is unbiased



How to write prompts

- **Key rule:** Quality of the prompt affects the quality of the output
- **Prompt design:** The design the prompt to get the best output you want
- Prompt examples:
“Generate a list of 5 potential themes for an event” vs
“Generate a list of 5 potential themes for a professional conference on customer experience in the hospitality industry.”
- The latter prompt has specific, relevant context and instructions
- *Note: There will be instance where you will not get a quality output regardless of the quality of your prompt due to the limitations of LLMs*



Iterative process in prompt engineering

- Sometimes when you provide a quality prompt, it may not generate the you want on your first try
- In this instance, you can revise the prompt.
- On the second or subsequent iterations, try to be more specific or provide clearer instruction to produce a more useful output.



Prompt Examples: Information Retrieval

- Question Answering: "What is the capital of France?"
- Summarization: "Summarize the key findings of this research paper."
- Topic Exploration: "Provide five interesting facts about space exploration."



Prompt Examples: Creative Writing/Content Creation

- Story Starter: "Once upon a time, in a world where..."
- Poem Generator: "Compose a poem in the style of [famous poet] about [theme or topic]."
- Script Writing: "Create a movie scene showcasing a tense conversation between two characters."



Prompt Examples: Code Generation

- Function Creation: "Write a Python function that takes two numbers as input and returns their sum."
- Code Translation: "Translate this Java code into Python."
- Bug Fixing: "Fix the syntax error in this code snippet."



Prompt Examples: Translation

- Language Translation: "Translate this sentence from English to Spanish."
- Dialect Conversion: "Rewrite this text in British English."
- Formal/Informal Conversion: "Write a more formal version of this email."



Group Exercise 1 (20 mins): Content Creation with Prompt Engineering

- Appoint a prompt engineer in the group. The rest of the group members give ideas and suggestions to the prompt design and assist to verify the output quality
- Ask an LLM to create an outline for an article on the importance of energy conservation. The article should include the use of data visualization to help guide energy usage and consumption.
- Use one of the LLM tools below. You may create an account on the website or use it without one:
 - ChatGPT at <https://chatgpt.com/>
 - Claude at <https://claude.ai/>
 - Copilot at <https://copilot.microsoft.com/>
 - Gemini at <https://gemini.google.com/>
 - Llama at <https://llama.meta.com/>
- Share your solution using a slide deck



Tips on creating MS Powerpoint via Outline

- Cut and paste the outline output by the LLM into MS Word
- Save the file in rich text format
- Create level 1 and 2 bullets based on the outline
- Open MS PowerPoint, in the 'New Slide' click the down arrow and select 'Slides from Outline.'
- Upload the .rtf file you just created
- Use the Designer function in MS PowerPoint to develop an attractive slide deck



Group Exercise 2 (20 mins): Summarization

- Appoint a prompt engineer in the group. The rest of the group members give ideas and suggestions to the prompt design and assist to verify the output quality
- Ask an LLM to summary a lengthy document one paragraph not more than 100 words.
- Use one of the LLM tools below. You may create an account on the website or use it without one:
 - ChatGPT at <https://chatgpt.com/>
 - Claude at <https://claude.ai/>
 - Copilot at <https://copilot.microsoft.com/>
 - Gemini at <https://gemini.google.com/>
 - Llama at <https://llama.meta.com/>
- Share your findings