Generative AI for beginners: Session II

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Generative AI - Part 2

Prompt Engineering

What is Prompt Engineering?

- Developing **prompts** to effectively use LLMs (Large language Models)
- LLMs are general purpose models useful for various complex tasks
- You can extend the capability as well as understand the limitations of LLMs through prompts

Why the word **engineering**?

- Systematic and deliberate approach to designing the prompts
- Similar to designing a complex system, you can build it iteratively, piece it together
- You need to learn to engineer the right words as the words used in the prompt can have a significant impact on the quality and relevance of the generated text.

Prerequisites

Skill	Required?	Comments
Coding	Not mandatory	Having coding experience can make it more efficient to write good prompts
Verbal & Communication skills	Yes	To be able to give articulate the requirements very effectively
AI Technology	Yes	Need to have a comprehensive knowledge of AI technologies to be able to use them
Natural Language Processing	Not mandatory	Learning about NLP can definitely be useful in understanding how to best iterate to come to great prompts
Data Analysis	Yes	To understand the input, evaluate the output of these AI models

LLM parameters/settings - OpenAI - chat completion

Configurable parameters that you can change to adjust to get the expected quality of results. This can vary based on the task at hand.

Temperature: Controls randomness of the model

In case of low temperature, model picks the most probable word. Higher temperature encourages more random creative outputs. It can pick less probable words.

Top_p: To control how deterministic the model is at generating a response.

Samples words that have likelihood > p

Recommendation is to alter one at a time

- Output can vary based on the model used (obviously :))

Prompting Techniques

Zero Shot Learning: Directly instruct the model to do a task

Tell me interesting facts about San Francisco

Few Shot Learning: Give 2-3 examples of what you expect the model to do and then ask it to do it

Capital of Canada is Ottawa, capital of India is Delhi, capital of United States is

Chain Of Thought: This enhances the model's reasoning capabilities. Hand holding the model to show intermediate logic steps to come to the correct answer

The odd numbers in this group add up to an even number: 17, 9, 10, 12, 13, 4, 2.
A: Adding all the odd numbers (17, 9, 13) gives 39. The answer is False.
The odd numbers in this group add up to an even number: 15, 32, 5, 13, 82, 7, 1.
A:

Elements of a prompt

Instruction - a specific task or instruction you want the model to perform

Context - external information or additional context that can steer the model to better responses

Input Data - the input or question that we are interested to find a response for(ex: user query)

Output Indicator - the type or format of the output

Prompt writing guidelines

- Write clear and specific instructions
  - Natural Language itself is ambiguous, so use sentences that are precise

- Build on prompts iteratively
  - The first prompt might not be the best one

- Evaluate the prompt results and refine as you go
  - Based on the output, you can rework on the prompt to get to a prompt that finally meets your expectations

Prompt Evaluation

- Observe the model output for the prompt
- Did the model understand the instruction well?
- In case of few shot learning, does the model understand the examples?
- Does it overfit on the given examples?

Tasks that LLMs can do

- Summarizing
  - Extraction of information
- Inferring
  - Sentiment
- Transform
  - Translation to different languages
  - Translation between different formats
  - Transform the tone - formal to informal
  - Spellcheck and grammar check

- Code related:
  - Code generation
  - Code debugging

- Novel text generation
  - Write an email
  - Write a job description

Resources

https://learnprompting.org/docs/intro

https://www.promptingguide.ai/introduction

https://huyenchip.com/2023/04/11/llm-engineering.html#prompt_evaluation

OpenAI Demo

- Playground - https://platform.openai.com/playground
  - Build your own customer service agent
- Jupyter Notebook examples
  - Zero Shot Learning
  - Summarization