Prompt Engineering Programming Assignment 2

Due Date: Aug 28 2024 (BEFORE START OF CLASS)
Artifact: Submit your Notebook committed in Git directly to me in a Direct Message on Class Discord Server.

Question 1: Chain-of-Thought Prompting [20 Marks]

Implement a Chain-of-Thought prompting system to solve word problems. Your system should break down the problem-solving process into steps and show its reasoning.

Task:

- Create a function that takes a word problem as input.
- Use the OpenAI API or any other LLM API to generate a step-by-step solution.
- The output should show each step of the reasoning process.
- Test your function with at least two word problems of varying complexity.

Example word problem: "A baker has 150 eggs. If each cake requires 3 eggs and each cookie requires 2 eggs, how many cakes and cookies can the baker make if they want to use all the eggs and make an equal number of each?"

Question 2: Prompt-chaining [20 Marks]

Develop a prompt-chaining system that generates a short story based on user input. The system should use multiple prompts in sequence, with each prompt building on the output of the previous one.

Task:

- Create a series of at least 3 prompts that will be chained together.
- The first prompt should ask for a genre and main character.
- Subsequent prompts should build on previous outputs to develop the plot and conclusion.
- Implement the chaining logic to pass information between prompts.
- Allow the user to input the initial genre and main character.
- Output the final story generated through the chain.

Question 3: Tree-of-Thought Prompting [20 Marks]

Implement a Tree-of-Thought prompting system to solve a complex problem. The system should explore multiple paths of reasoning and select the most promising one.

Task:

- Create a function that takes a complex problem as input.
- Generate at least 3 different initial approaches to solving the problem.
- For each approach, develop 2-3 possible next steps.
- Implement a method to evaluate the promise of each path.
- Select the most promising path and generate a final solution.
- Test your system with the following problem:

Problem: "Design a sustainable urban transportation system for a city of 1 million people. Consider factors such as environmental impact, cost-effectiveness, and accessibility for all residents."