




UiT The Arctic
University of Norway



BIO-AI LAB | ARCTIC LLM WORKSHOP 2023
Large Language Models

Day 2 - Session 2
A Walkthrough on Prompting Techniques

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*“prompt is a **text** that goes inside the LLM”*

*“prompt engineering is the art of designing that **text**”*

Agenda

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- Prompts can do anything**

High-level intuitions for prompting

- Prompting Techniques**

From zero-shot to graph prompting

- How to write a good prompt**

A useful guide for an effective prompting


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How are prompts made?



By an end-to-end user [1]

I You are a good language translator. I want you to translate the following sentence from English to Norwegian
"Hi, my name is Iqra. Lets have a talk about giving prompts to chat gpt without knowing how it is executing my task"

 Sure! Here's the translation in Norwegian:
"Hei, navnet mitt er Iqra. La oss snakke om å gi oppgaver til chat gpt uten å vite hvordan den utfører oppgaven min."

Note: Translation may not always capture every nuance of the original text. It's always a good idea to consult with native speakers or use professional translation services for critical tasks.

By a developer [2]

```
from langchain import PromptTemplate

template = """
I want you to act as a naming consultant for new companies.
What is a good name for a company that makes {product}?
"""

prompt = PromptTemplate(
    input_variables=["product"],
    template=template,
)

prompt.format(product="colorful socks")

## Output
# I want you to act as a naming consultant for new companies.
# What is a good name for a company that makes colorful
```

[1] <https://chat.openai.com/c/3a37d2fc-4eb7-4106-95bf-2c6e503fdca5>

[2] https://twitter.com/pwang_szn/status/1658774431454597121

How to talk to LLM?



Prompt Elements

<i>Input/ Context -----</i>	<i>You are an expert sentiment analyzer</i>
<i>Instructions -----</i>	<i>Classify given text into positive, negative & neutral</i>
<i>Questions -----</i>	<i>Text: I enjoy prompt engineering</i>
<i>Example -----</i>	<i>I do not like to code, negative</i>
<i>Output format -----</i>	<i>Sentiment:</i>

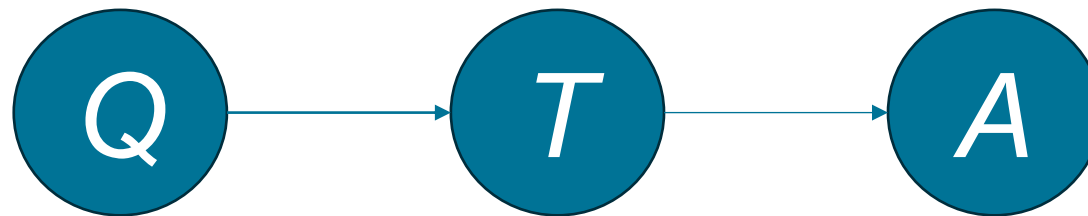
Use Cases

Text Summarization
Question Answering
Code Generation
Role Playing
Text Classification
Reasoning
Art Generation
Grammar Correction
Bug Finding
Language Translation & many more

Modern probabilistic prompts are getting better



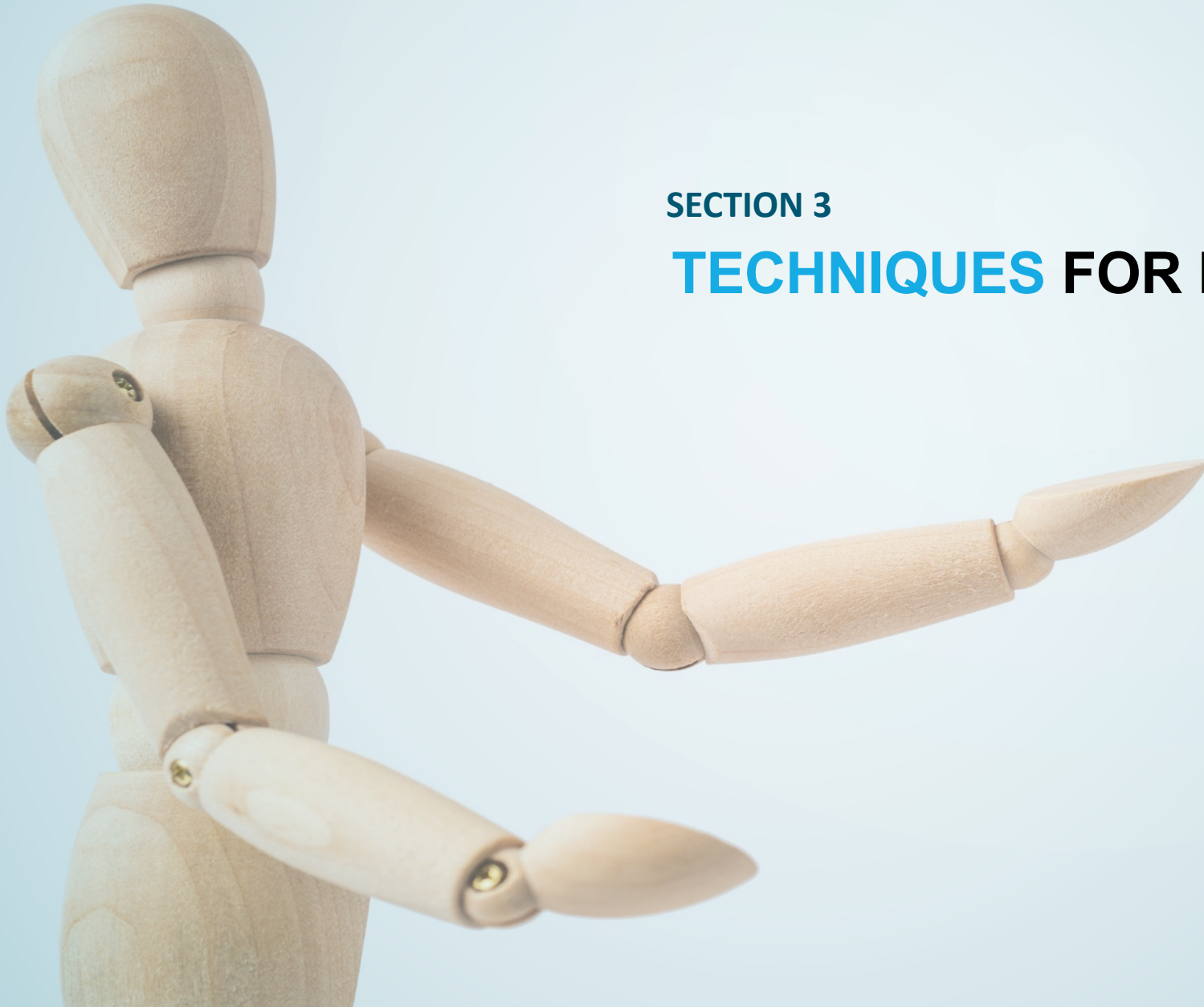
```
def qta():  
    Q = "Who was president during moon  
        landing?"  
    T = yield S('thought' , question=Q)  
    A = yield S('answer' , thought=T)  
  
    return A
```



Remember, it's just about asking, but how you ask!!!

SECTION 3

TECHNIQUES FOR PROMPTING



Evolution of Modern Prompting: A Quick Dive

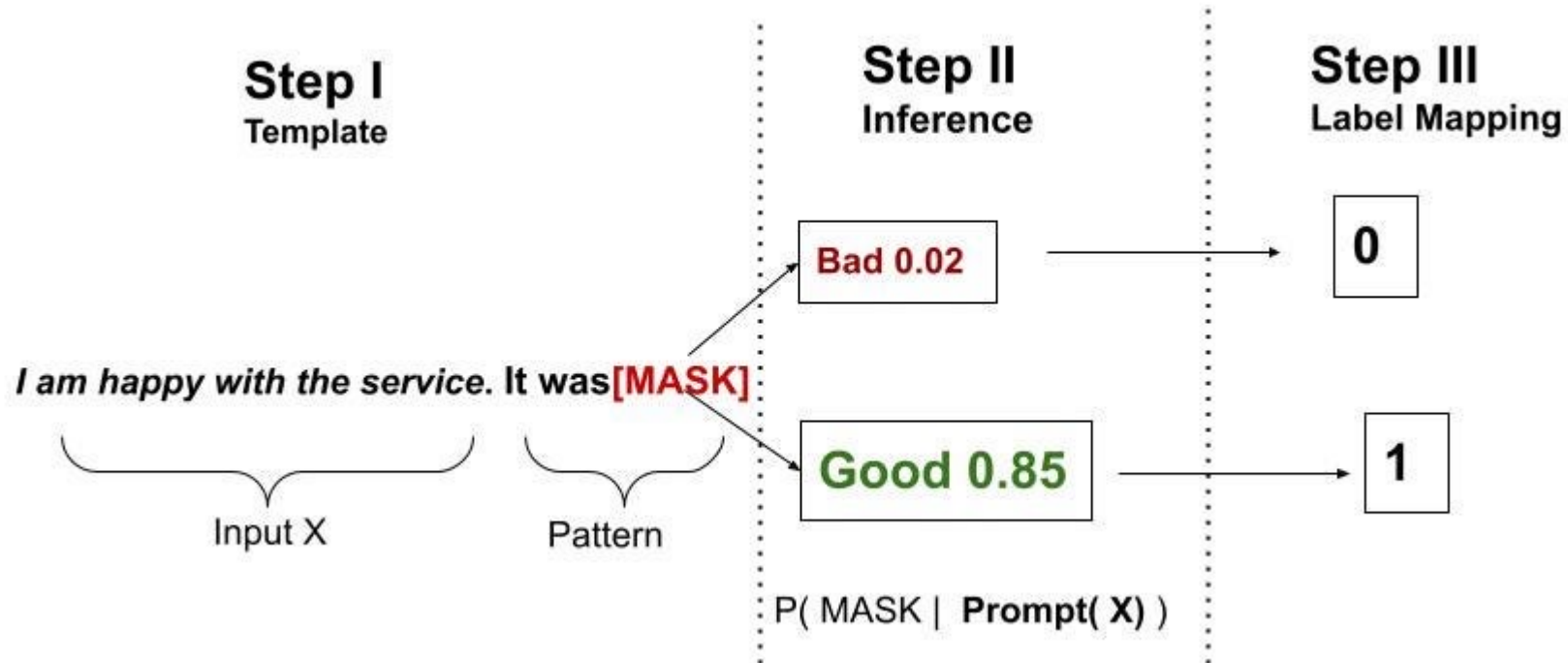


- 1.The Genesis:** Simple queries directing basic outputs.
E.g., "Translate this to French."
- 2.Layered Prompts:** Introducing context and depth.
E.g., "Translate this 19th-century poem to modern-day French."
- 3.Dynamic Interactions:** Real-time adjustments and feedback loops.
E.g., Iterative refining based on the model's previous answers.
- 4.Personalized Prompts:** Tailored to individual user profiles and preferences.
E.g., "Translate this poem to French, keeping my love for nature in mind."
- 5.Meta-Prompting:** Prompts that guide the model on how to think about prompts.
E.g., "Consider the previous prompts I've given and provide a French translation in a similar tone."

Zero-Shot Prompting

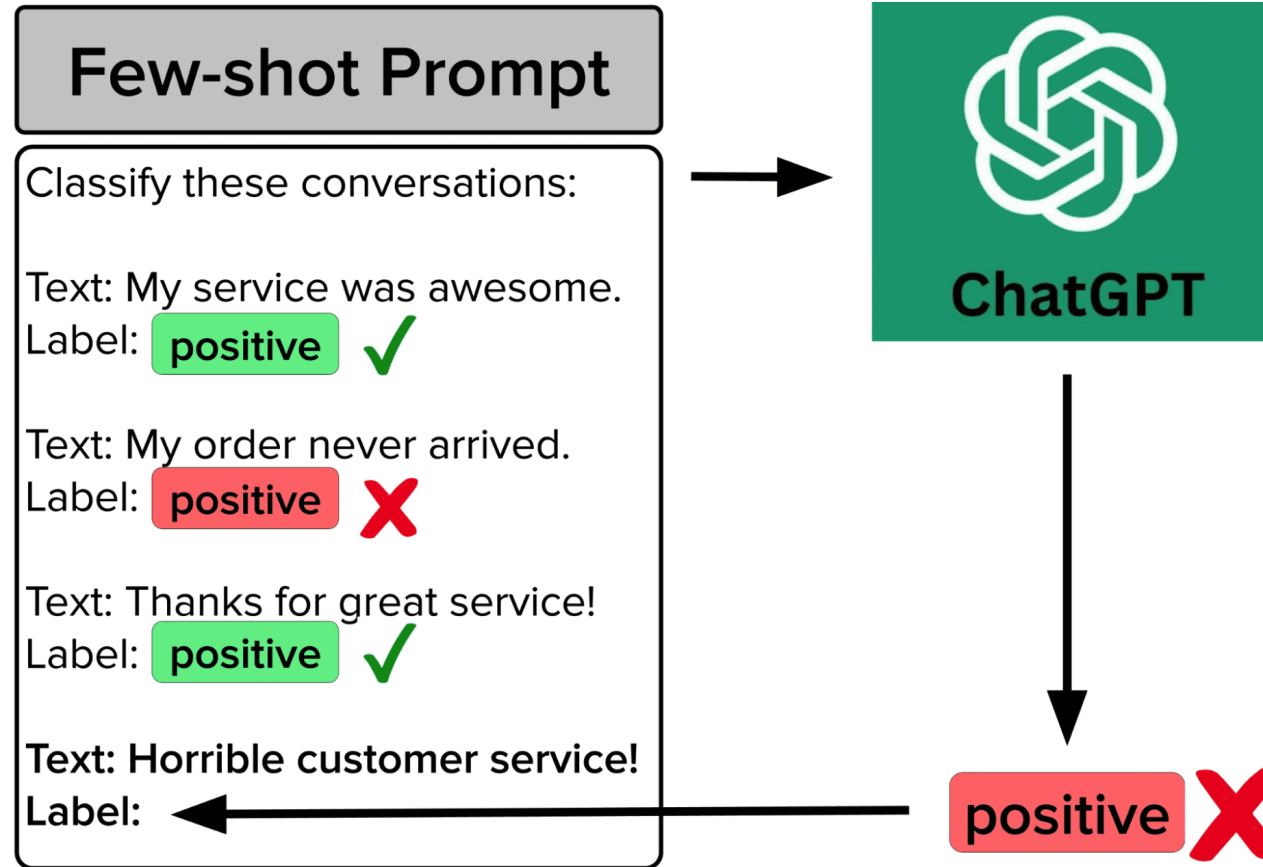


A model is asked to perform a task or query that it hasn't been specifically trained on.



Few-Shot Prompting

A model is given a prompt and a few examples of text.



Chain-Of-Thought (CoT) Prompting



A model is enabled for complex reasoning capabilities through intermediate reasoning steps.

Standard Prompting

Model Input

Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

A: The answer is 11.

Q: The cafeteria had 23 apples. If they used 20 to make lunch and bought 6 more, how many apples do they have?

Model Output

A: The answer is 27. ❌

Chain-of-Thought Prompting

Model Input

Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

A: Roger started with 5 balls. 2 cans of 3 tennis balls each is 6 tennis balls. $5 + 6 = 11$. The answer is 11.

Q: The cafeteria had 23 apples. If they used 20 to make lunch and bought 6 more, how many apples do they have?

Model Output

A: The cafeteria had 23 apples originally. They used 20 to make lunch. So they had $23 - 20 = 3$. They bought 6 more apples, so they have $3 + 6 = 9$. The answer is 9. ✅

Self-Ask Prompting



A model is given a prompt and a **few example** LLM reasoning is shown explicitly and the LLM also decomposes the question into smaller follow-up questions **of text**.

Direct Prompting

GPT-3

Question: Who lived longer, Theodor Haecker or Harry Vaughan Watkins?
Answer: Harry Vaughan Watkins.

Question: Who was president of the U.S. when superconductivity was discovered?
Answer: Franklin D. Roosevelt



Chain of Thought

GPT-3

Question: Who lived longer, Theodor Haecker or Harry Vaughan Watkins?
Answer: Theodor Haecker was 65 years old when he died. Harry Vaughan Watkins was 69 years old when he died.
So the final answer (the name of the person) is: Harry Vaughan Watkins.

Question: Who was president of the U.S. when superconductivity was discovered?
Answer: Superconductivity was discovered in 1911 by Heike Kamerlingh Onnes. Woodrow Wilson was president of the United States from 1913 to 1921. So the final answer (the name of the president) is: Woodrow Wilson.



Self-Ask

GPT-3

Question: Who lived longer, Theodor Haecker or Harry Vaughan Watkins?
Are follow up questions needed here: Yes.
Follow up: How old was Theodor Haecker when he died?
Intermediate answer: Theodor Haecker was 65 years old when he died.
Follow up: How old was Harry Vaughan Watkins when he died?
Intermediate answer: Harry Vaughan Watkins was 69 years old when he died.
So the final answer is: Harry Vaughan Watkins

Question: Who was president of the U.S. when superconductivity was discovered?
Are follow up questions needed here: Yes.
Follow up: When was superconductivity discovered?
Intermediate answer: Superconductivity was discovered in 1911.
Follow up: Who was president of the U.S. in 1911?
Intermediate answer: William Howard Taft.
So the final answer is: William Howard Taft.



ReAct



The idea of ReAct is to combine **thought, reasoning, observation and taking action**

Query: Aside from the Apple Remote, what other devices can control the program Apple Remote was originally designed to interact with?

(1d) ReAct (Reason + Act)

Thought 1: I need to search Apple Remote and find the program it was originally designed to interact with.

Act 1: `Search[Apple Remote]`

Obs 1: The Apple Remote is a remote control introduced in October 2005 by Apple ... originally designed to control the `Front Row media center` program ...

Thought 2: Apple Remote was originally designed to control the Front Row media center program. I need to search `Front Row` next and find what other device can control it.

Act 2: `Search[Front Row]`

Obs 2: Could not find [Front Row]. Similar: ['Front Row Seat to Earth', 'Front Row Motorsports', '`Front Row (software)`', ...]

Thought 3: `Front Row` is not found. I need to search `Front Row (software)` .

Act 3: `Search[Front Row (software)]`

Obs 3: `Front Row` is a discontinued media center software ...

Thought 4: `Front Row (software)` is controlled by an Apple Remote or the keyboard function keys. So the answer is keyboard function keys.

Act 4: `Finish[keyboard function keys]`



A few more techniques to play with...



Tree Of Thought (ToT)

Self Consistency

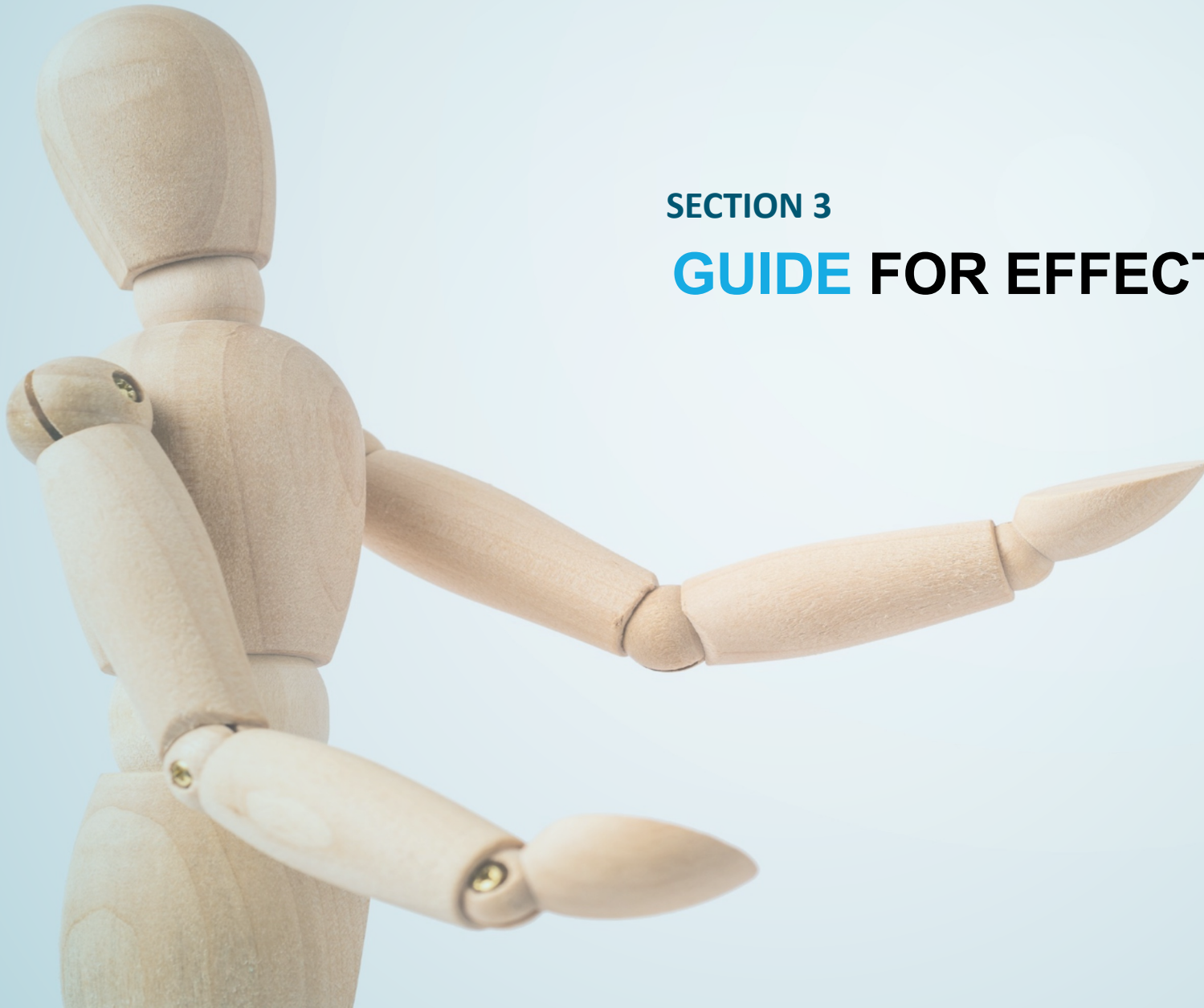
Multimodal CoT

Graph Prompting

Generated Knowledge

SECTION 3

GUIDE FOR EFFECTIVE PROMPTING



Put instructions at the beginning of the prompt and use `###` or `"""` to separate the instruction and context

Less effective ❌

```
Summarize the text below as a bullet point
list of the most important points.
```

```
{text input here}
```

Better ✅

```
Summarize the text below as a bullet
point list of the most important
points.
```

```
Text: """
```

```
{text input here}
```

```
"""
```

Be specific, descriptive and as detailed as possible about the desired context, outcome, length, format, style, etc.

Less effective ❌

Write a poem about OpenAI.

Better ✅

Write a short inspiring poem about OpenAI, focusing on the recent DALL-E product launch (DALL-E is a text to image ML model) in the style of a {famous poet}

Articulate the desired output format through structured text

Less effective ❌

```
Extract the entities mentioned in the text
below. Extract the following 4 entity types:
company names, people names, specific topics
and themes.
```

```
Text: {text}
```

Better ✅

```
Extract the important entities mentioned in the text
below. First extract all company names, then extract
all people names, then extract specific topics which
fit the content and finally extract general
overarching themes
```

```
Desired format:
```

```
Company names:
```

```
<comma_separated_list_of_company_names>
```

```
People names: -||-
```

```
Specific topics: -||-
```

```
General themes: -||-
```

```
Text: {text}
```

Reduce “fluffy” and imprecise descriptions

Less effective ❌

The description for this product should be short, a few sentences only, and not too much more.

Better ✅

Use a 3 to 5 sentence paragraph to describe this product.

Instead of just saying what not to do, say what to do instead

Less effective ❌

The following is a conversation between an Agent and a Customer. DO NOT ASK USERNAME OR PASSWORD. DO NOT REPEAT.

Customer: I can't log in to my account.

Agent:

Better ✅

The following is a conversation between an Agent and a Customer. The agent will attempt to diagnose the problem and suggest a solution, whilst refraining from asking any questions related to PII. Instead of asking for PII, such as username or password, refer the user to the help article www.samplewebsite.com/help/faq

Customer: I can't log in to my account.

Agent:

Start with zero-shot, then few-shot

✓ Zero-shot

```
Extract keywords from the below text.
```

```
Text: {text}
```

```
Keywords:
```

✓ Few-shot - provide a couple of examples

```
Extract keywords from the corresponding texts below.
```

```
Text 1: Stripe provides APIs that web developers can use to integrate payment processing into their websites and mobile applications.
```

```
Keywords 1: Stripe, payment processing, APIs, web developers, websites, mobile applications  
##
```

```
Text 2: {text}
```

```
Keywords 2:
```

Code Generation Specific - Use “leading words” to nudge the model toward a particular pattern

Less effective ❌

```
# Write a simple python function that
# 1. Ask me for a number in mile
# 2. It converts miles to kilometers
```

Better ✅

```
# Write a simple python function that
# 1. Ask me for a number in mile
# 2. It converts miles to kilometers

import
```

Code Generation Specific - Use “leading words” to nudge the model toward a particular pattern

Less effective ❌

```
# Write a simple python function that
# 1. Ask me for a number in mile
# 2. It converts miles to kilometers
```

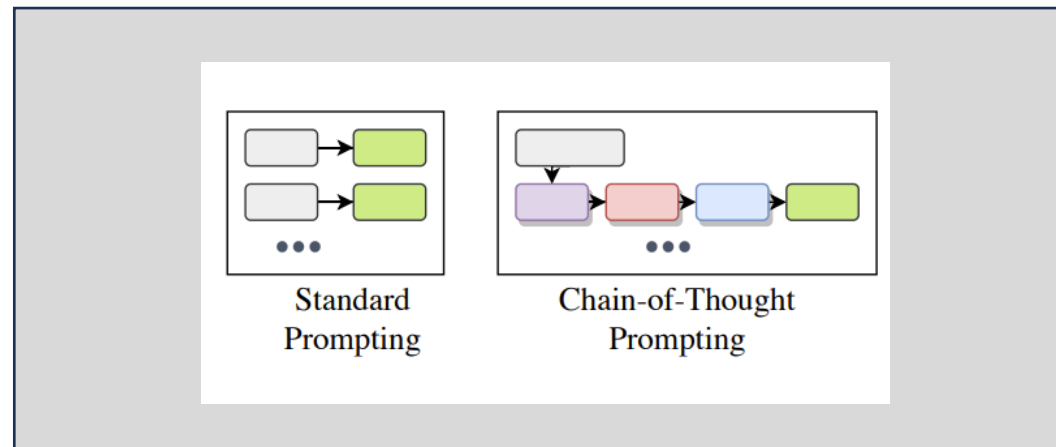
Better ✅

```
# Write a simple python function that
# 1. Ask me for a number in mile
# 2. It converts miles to kilometers

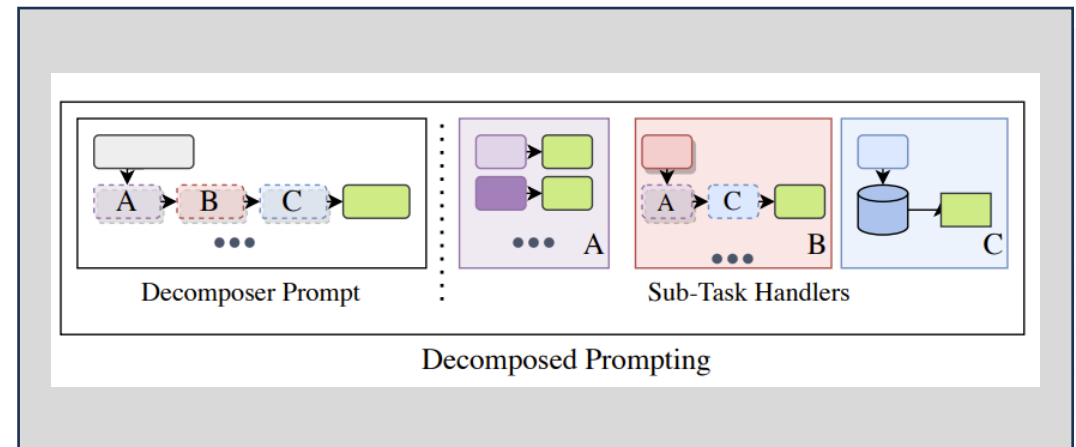
import
```


Decomposition and reasoning

Less effective ❌



Better ✅



Self-criticism, asking model to fix its output

Less effective ❌

Q: Valerie earns \$5000 per month, 1/2 of what her brother earns. If their mother earns twice their combined salary, what's the total amount of money they all have together?

Few-Shot-CoT

A: Valerie earns \$5000 per month, half of her brother's earnings, making his monthly income \$10000. Combined, Valerie and her brother earn \$15000 per month. Their mother earns double their combined salary, amounting to \$30000 per month. In total, they have \$30000 collectively. (Wrong)

Better ✅

A: Valerie's brother earns \$10,000 per month, while Valerie herself earns half of that amount. Combined with the mother's salary \$30,0000.

Review your previous answer and find problems with your answer.

All individuals, including Valerie, her brother, and mother, should be considered when calculating the overall sum of money.

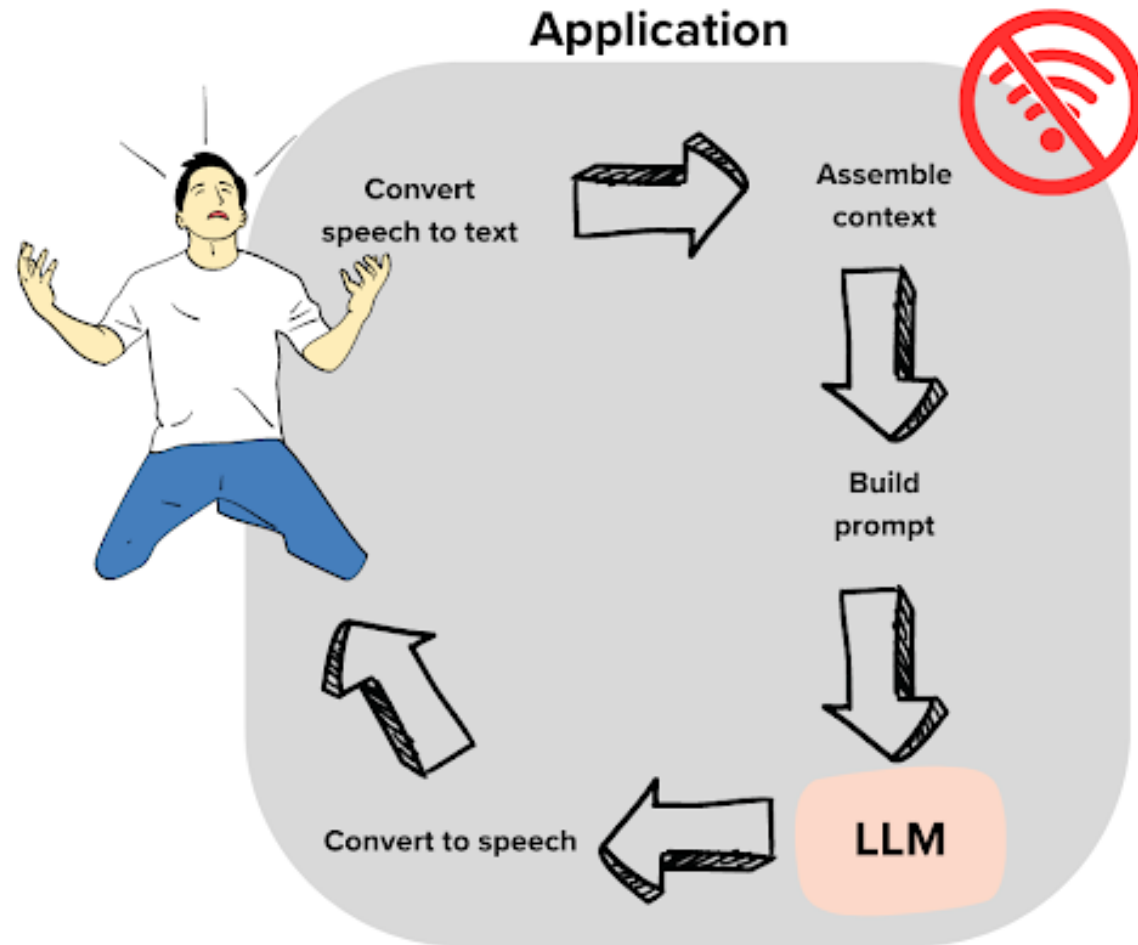
Based on the problems you found, improve your answer.

Valerie's brother earns \$10,000 per month, while Valerie herself earns \$5,000. Together, they earn a total of \$15,000 per month. Their mother earns double their combined salary, which amounts to \$30,000 per month. In total, they have \$45,000 collectively.

(Correct)

In short

- Assign a role*
- Give a format*
- Give Example (If possible)*
- Format the output*
- Give leading words / cues*
- Ask to generate prompt*
- Emphasize on reasoning and CoT*
- Be clear , be specific ...*





<https://en.uit.no/enhet/ifi>

Thank You

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