

Meta Prompting: A Practical Guide to Optimising Prompts Automatically

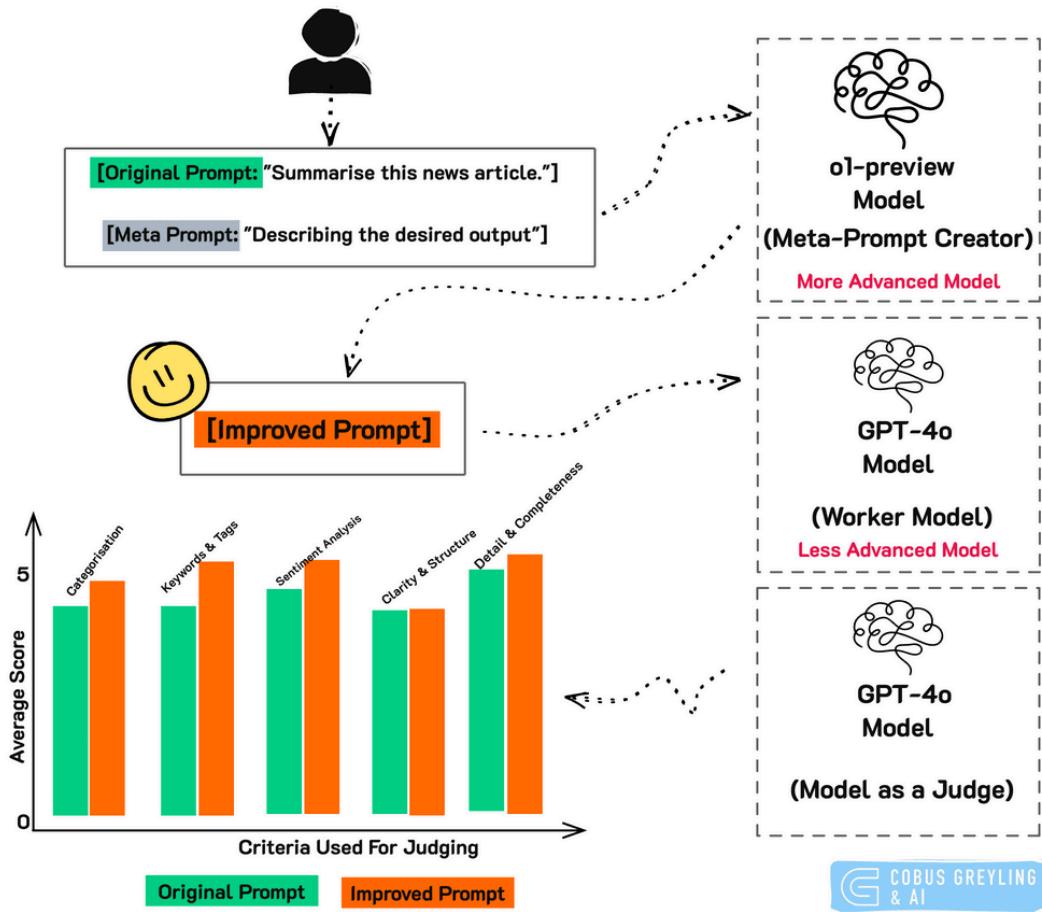
Discover how meta prompting can enhance your results by using advanced models to optimise prompts for simpler ones.

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Meta Prompting A Practical Guide to Optimising & Test Prompts Automatically



In this post, I'll walk you through the process of refining a **basic prompt** to improve the quality of outputs from a language model.

I'll use an adapted example of summarising news articles to demonstrate how it works, from the OpenAI Cookbook.

What is Meta Prompting?

Meta prompting is a technique where one Language Model (LLM) is used to generate or optimise prompts for another Language Model.

Typically, a *more advanced* model (**o1-preview**) is employed to refine prompts for a *less sophisticated* model (**GPT-4o**).

The goal is to create prompts that are clearer, more structured, and better at guiding the target model to produce high-quality, relevant responses.

By leveraging the advanced *reasoning* capabilities of models like **o1-preview**, we can systematically enhance prompts to ensure they're more effective in eliciting the desired outputs.

Why Use Meta Prompting?

This technique simplifies the development process when working with LLMs, making it easier to achieve better results.

It's especially useful for tasks like summarisation, question-answering, or any scenario where precision matters..

How It Works

I'll begin with a simple prompt designed to summarise news articles.

Then, using **o1-preview**, I'll analyse and refine it step by step, adding *clarity* and *detail* to improve its effectiveness.

Finally, evaluate the outputs systematically to measure the impact of our changes.

The code below performs the necessary installs and imports. It will also prompt you for your OpenAI API key.

```
!pip install datasets openai pandas tqdm

import pandas as pd
import getpass
import matplotlib.pyplot as plt
from concurrent.futures import ThreadPoolExecutor, as_completed
from tqdm import tqdm
from pydantic import BaseModel
from datasets import load_dataset

# Initialize OpenAI client
api_key = getpass.getpass("Enter your OpenAI API key: ")
client = openai.OpenAI(api_key=api_key)

ds = load_dataset("RealTimeData/bbc_news_alltime", "2024-08")
df = pd.DataFrame(ds['train']).sample(n=100, random_state=1)
df.head()
```

Below the top part of the data which is loaded into the application.

	title	published_date	authors	description	section	content	link	top_image
2662	Laura Whitmore: I was gaslighted after raising...	2024-08-04	https://www.facebook.com/bbcnews	The former Love Island host said that things s...	Culture	Television presenter Laura Whitmore has said t...	http://www.bbc.co.uk/news/articles/c9wwwz7x7o	https://ichef.bbci.co.uk/ace/standard/2560/cps...
1865	Errollyn Wallen appointed as Master of the Kin...	2024-08-25	https://www.facebook.com/bbcnews	She is best known for her work on the 2012 Par...	Culture	Celebrated composer and singer-songwriter Erro...	http://www.bbc.co.uk/news/articles/c04g758g7zgo	https://ichef.bbci.co.uk/ace/standard/2560/cps...
2554	SDLP: Matthew O'Toole endorses Claire Hanna fo...	2024-08-30	https://www.facebook.com/bbcnews	Matthew O'Toole had been named by some as a po...	Northern Ireland Politics	Matthew O'Toole leads his party's official opp...	http://www.bbc.co.uk/news/articles/cvg41j7xrzd0	https://ichef.bbci.co.uk/ace/standard/3840/cps...
1338	Rotherham rioters among those jailed - BBC News	2024-08-20	https://www.facebook.com/bbcnews	Two men who were part of a mob targeting a Hol...	South Yorkshire	Rotherham pair among those jailed for UK riot...	http://www.bbc.co.uk/news/articles/cwywggd7qw6o	https://ichef.bbci.co.uk/ace/standard/2560/cps...
1232	BBC News - BBC iPlayer	2024-08-02	None	None	None	JavaScript seems to be disabled. Please enable...	http://www.bbc.co.uk/news/10318089	

First we are going to prompt the **o1-preview** with a simple prompt as defined below.

In order to improve the simple prompt, guidance and context needs to be given to the **o1-preview** model in order to achieve the desired results.

```
simple_prompt = "Summarize this news article: {article}"

meta_prompt = """
Improve the following prompt to generate a more detailed summary.
Adhere to prompt engineering best practices.
Make sure the structure is clear and intuitive and contains the type of news, tags and sentiment analysis.

{simple_prompt}

Only return the prompt.
"""

def get_model_response(messages, model="o1-preview"):
    response = client.chat.completions.create(
        messages=messages,
        model=model,
    )
    return response.choices[0].message.content

complex_prompt = get_model_response([
    {"role": "user", "content": meta_prompt.format(simple_prompt=simple_prompt)}])
complex_prompt
```

And here is the enhanced **prompt** generated by our advanced or superior model:

```
Please read the following news article and provide a detailed summary that includes:
- **Type of News**: Categorize the article (e.g., Politics, Technology, Sports, Business, etc.).
- **Tags**: List relevant keywords or phrases associated with the article.
- **Sentiment Analysis**: Analyze the overall tone (e.g., Positive, Negative, Neutral) and provide a brief explanation.
Ensure the summary is well-structured and easy to understand.
**Article**:
{article}
```

OK, now we have our simple prompt and advanced prompt. So we can now use the simple and advanced prompts on your dataset and compare the results.

We are running the prompts now against our inferior model.

```

def generate_response(prompt):
    messages = [{"role": "user", "content": prompt}]
    response = get_model_response(messages, model="gpt-4o-mini")
    return response

def generate_summaries(row):
    simple_itinerary = generate_response(simple_prompt.format(article=row["content"]))
    complex_itinerary = generate_response(complex_prompt + row["content"])
    return simple_itinerary, complex_itinerary

generate_summaries(df.iloc[0])

```

Comparing the summaries from the simple and enhanced prompts reveals a noticeable improvement.

While the initial summary offers a broad overview, the enhanced version goes further, providing a detailed breakdown, categorising the news type, listing relevant tags, and even analysing sentiment.

('Television presenter Laura Whitmore has spoken out about her experiences on "Strictly Come Dancing," where she was partnered with Giovanni Pernice in 2016. In a recent interview, she discussed how issues she attempted to raise at the time are now surfacing, expressing that she felt "gaslit" during her time on the show. Whitmore revealed that her experience left her feeling "broken" and that she had faced negative portrayals as merely "blonde bait in a sequinned dress." Despite the challenges, she noted that women in the public eye are becoming more vocal and are bringing attention to inappropriate behavior.\n\nWhitmore mentioned that she had raised concerns about incidents involving inappropriate behavior with others from the show but did not file an official complaint. Giovanni Pernice has refuted claims of abusive behavior and is cooperating with an ongoing BBC review into these allegations. "Strictly Come Dancing" has recently faced scrutiny as multiple allegations regarding the treatment of contestants, including comments from actress Amanda Abbington and TV star Zara McDermott, have emerged. In response, the BBC plans to enhance welfare measures for contestants, including the introduction of a chaperone during rehearsals and a commitment to taking complaints seriously.', '\n*** Summary of News Article\n-- **Type of News**: Entertainment / Social Issues\n-- **Tags**: Laura Whitmore, Strictly Come Dancing, allegations, gaslighting, BBC, Giovanni Pernice, inappropriate behavior, celebrity culture, welfare support, mental health\n-- **Sentiment Analysis**: The overall tone of the article is +Negative+. The article discusses serious allegations regarding inappropriate behavior and psychological manipulation experienced by television presenter Laura Whitmore during her participation in "Strictly Come Dancing." Whitmore expresses her frustration over feeling gaslit and not taken seriously when she raised concerns in the past. The article also touches on the troubling experiences of other participants, indicating a broader issue of mistreatment and the need for stronger welfare measures within the show. The overall narrative highlights a culture of victim-blaming and a lack of accountability within the BBC for issues in the public eye. Whitmore's statement in the interview with The Irish Times, where she claimed that she was "gaslit" into believing her experiences were normal, has come as allegations from other former contestants have surfaced, bringing scrutiny to the treatment of celebrities on the show.\n\nWhitmore, who was partnered with dancer Giovanni Pernice in 2016, narrated that her experience on the show left her feeling "broken," mentioning she cried daily due to the pressure and negativity surrounding her portrayal. She reflects on changes in societal attitudes towards such issues, suggesting that women are "louder" and more assertive now compared to the past.\n\nIn her recent statements, Whitmore revealed that, along with six unnamed individuals, she had raised concerns about inappropriate behavior related to the same person who impacted her experience. Although she has not made an official complaint, she remains engaged in supporting the BBC's investigation into the matter.\n\nThe article references several other contestants, including Amanda Abbington and Zara McDermott, who have also voiced allegations against Giovanni Pernice and other professionals on the show. In response to these serious claims, the BBC has committed to implementing additional welfare measures and support systems on "Strictly," including the presence of a chaperone during training sessions.\n\nThe BBC has affirmed that it takes all complaints seriously and is continuously reviewing and updating its protocols to ensure the well-being of everyone involved in the show. However, they have refrained from commenting on individual cases, seeking to maintain confidentiality and fairness in the handling of complaints.')

Testing the entire dataset now...

```

# Add new columns to the dataframe for storing itineraries
df['simple_summary'] = None
df['complex_summary'] = None

# Use ThreadPoolExecutor to generate itineraries concurrently
with ThreadPoolExecutor() as executor:
    futures = {executor.submit(generate_summaries, row): index for index, row in df.iterrows()}
    for future in tqdm(as_completed(futures), total=len(futures), desc="Generating Itineraries"):
        index = futures[future]
        simple_itinerary, complex_itinerary = future.result()
        df.at[index, 'simple_summary'] = simple_itinerary
        df.at[index, 'complex_summary'] = complex_itinerary

df.head()

```

And the result...

	title	published_date	authors	description	section	content	link	top_image	simple_summary	complex_summary
2662	Laura Whitmore: I was gaslighted after raising...	2024-08-04	https://www.facebook.com/bbcnews	The former Love Island host said that things s...	Culture	Television presenter Laura Whitmore has said t...	http://www.bbc.co.uk/news/articles/c9wwwz7x7o https://ichef.bbci.co.uk/ace/standard/2560/cps...	Television presenter Laura Whitmore has recentl...	### Summary of the Article\n\n- Type of News...	
1865	Errollyn Wallen appointed as Master of the Kin...	2024-08-25	https://www.facebook.com/bbcnews	She is best known for her work on the 2012 Par...	Culture	Celebrated composer and singer-songwriter Erro...	http://www.bbc.co.uk/news/articles/c4gj758g7zgo https://ichef.bbci.co.uk/ace/standard/2560/cps...	Errollyn Wallen, a celebrated composer and sin...	### Summary of the News Article\n\n- Type of News...	
2554	SDLP: Matthew O'Toole endorses Claire Hanna fo...	2024-08-30	https://www.facebook.com/bbcnews	Matthew O'Toole had been named by some as a po...	Northern Ireland Politics	Matthew O'Toole leads his party's official opp...	http://www.bbc.co.uk/news/articles/cvg41j7xrzdo https://ichef.bbci.co.uk/ace/standard/3840/cps...	Matthew O'Toole, leader of the official opposi...	### Summary of News Article\n\n- Type of News...	
1338	Rotherham rioters among those jailed - BBC News	2024-08-20	https://www.facebook.com/bbcnews	Two men who were part of a mob targeting a Holl...	South Yorkshire	Rotherham pair among those jailed for UK riot...	http://www.bbc.co.uk/news/articles/cwywggd7qw6o https://ichef.bbci.co.uk/ace/standard/2560/cps...	Two men, Nathan Palmer (29) and Niven Matthew...	## Detailed Summary\n\n- Type of News...	
1232	BBC News - BBC iPlayer	2024-08-02	None	None	None	JavaScript seems to be disabled. Please enable...	http://www.bbc.co.uk/news/10318089	The article discusses the importance of enabili...	It appears that there is no actual news artic...	

Evaluating the Results

To compare the performance of the two prompts, use a structured approach where the language model itself acts as the judge.

This means the LLM will evaluate outputs based on specific criteria like accuracy, clarity, and relevance, providing an objective assessment without human bias. For more details, check out the OpenAI Evals cookbook.

evaluation_prompt = """

You are an expert editor tasked with evaluating the quality of a news article summary. Below is the original article and the summary to be evaluated:

Original Article:
{original_article}

Summary:
{summary}

Please evaluate the summary based on the following criteria, using a scale of 1 to 5 (1 being the lowest and 5 being the highest). Be critical in your evaluation and only give high scores for exceptional summaries:

- **Categorization and Context**: Does the summary clearly identify the type or category of news (e.g., Politics, Technology, Sports) and provide appropriate context?
- **Keyword and Tag Extraction**: Does the summary include relevant keywords or tags that accurately capture the main topics and themes of the article?
- **Sentiment Analysis**: Does the summary accurately identify the overall sentiment of the article and provide a clear, well-supported explanation for this sentiment?
- **Clarity and Structure**: Is the summary clear, well-organized, and structured in a way that makes it easy to understand the main points?
- **Detail and Completeness**: Does the summary provide a detailed account that includes all necessary components (type of news, tags, sentiment) comprehensively?

Provide your scores and justifications for each criterion, ensuring a rigorous and detailed evaluation.

```
class ScoreCard(BaseModel):
    justification: str
    categorization: int
    keyword_extraction: int
```

```
sentiment_analysis: int  
clarity_structure: int  
detail_completeness: int
```

The evaluation is run and stored in the data-frame.

```
def evaluate_summaries(row):  
    simple_messages = [{"role": "user", "content": evaluation_prompt.format(original_article=row["content"],  
summary=row['simple_summary'])}]  
    complex_messages = [{"role": "user", "content": evaluation_prompt.format(original_article=row["content"],  
summary=row['complex_summary'])}]  
  
    simple_summary = client.beta.chat.completions.parse(  
        model="gpt-4o",  
        messages=simple_messages,  
        response_format=ScoreCard)  
    simple_summary = simple_summary.choices[0].message.parsed  
  
    complex_summary = client.beta.chat.completions.parse(  
        model="gpt-4o",  
        messages=complex_messages,  
        response_format=ScoreCard)  
    complex_summary = complex_summary.choices[0].message.parsed  
  
    return simple_summary, complex_summary  
  
# Add new columns to the dataframe for storing evaluations  
df['simple_evaluation'] = None  
df['complex_evaluation'] = None  
  
# Use ThreadPoolExecutor to evaluate itineraries concurrently  
with ThreadPoolExecutor() as executor:  
    futures = {executor.submit(evaluate_summaries, row): index for index, row in df.iterrows()}  
    for future in tqdm(as_completed(futures), total=len(futures), desc="Evaluating Summaries"):  
        index = futures[future]  
        simple_evaluation, complex_evaluation = future.result()  
        df.at[index, 'simple_evaluation'] = simple_evaluation  
        df.at[index, 'complex_evaluation'] = complex_evaluation  
  
df.head()
```

Below the result...

Evaluating Summaries: 100% [██████] 100/100 [05:48<00:00, 3.49s/it]											
	title	published_date	authors	description	section	content	link	top_image	simple_summary	complex_summary	simple
2662	Laura Whitmore: I was gaslighted after raising...	2024-08-04	https://www.facebook.com/bbcnews	The former Love Island host said that things s...	Culture	Television presenter Laura Whitmore has said t...	http://www.bbc.co.uk/news/articles/c9wwwzm7x7o https://chef.bbci.co.uk/ace/standard/2560/cps...	Television presenter Laura Whitmore has recent...	### Summary of the Article\n\n- "Type of News..."	justification-identi...	
1865	Errollyn Wallen appointed as Master of the King...	2024-08-25	https://www.facebook.com/bbcnews	She is best known for her work on the 2012 Par...	Culture	Celebrated composer and singer-songwriter Erro...	http://www.bbc.co.uk/news/articles/o4gl758g7zgo https://chef.bbci.co.uk/ace/standard/2560/cps...	Errollyn Wallen, a celebrated composer and sin...	### Summary of the News Article\n\n- "Type of News..."	justification-"	
2554	SDLP: Matthew O'Toole endorses Claire Hanna fo...	2024-08-30	https://www.facebook.com/bbcnews	Matthew O'Toole had been named by some as a po...	Northern Ireland Politics	Matthew O'Toole leads his Party's official opp...	http://www.bbc.co.uk/news/articles/cvg4l7xrzdo https://chef.bbci.co.uk/ace/standard/3840/cps...	Matthew O'Toole, leader of the official opposi...	### Summary of News Article\n\n- "Type of News..."	ju Cat...	
1338	Rotherham rioters among those jailed - BBC News	2024-08-20	https://www.facebook.com/bbcnews	Two men who were part of a mob targeting a Hol...	South Yorkshire	Rotherham pair among those jailed for UK riot...	http://www.bbc.co.uk/news/articles/cwywggd7qw6o https://chef.bbci.co.uk/ace/standard/2560/cps...	Two men, Nathan Palmer (29) and Niven Matthewm...	### Detailed Summary\n\n- "Type of News: \n ...	ju Cat...	
1232	BBC News - BBC iPlayer	2024-08-02	None	None	None	JavaScript seems to be disabled. Please enable...	http://www.bbc.co.uk/news/10318089	The article discusses the importance of enabling...	It appears that there is no actual news artic...	"Cat...	

And the results are graphed...

```
import matplotlib.pyplot as plt

df["simple_scores"] = df["simple_evaluation"].apply(lambda x: [score for key, score in x.model_dump().items() if key != 'justification'])
df["complex_scores"] = df["complex_evaluation"].apply(lambda x: [score for key, score in x.model_dump().items() if key != 'justification'])

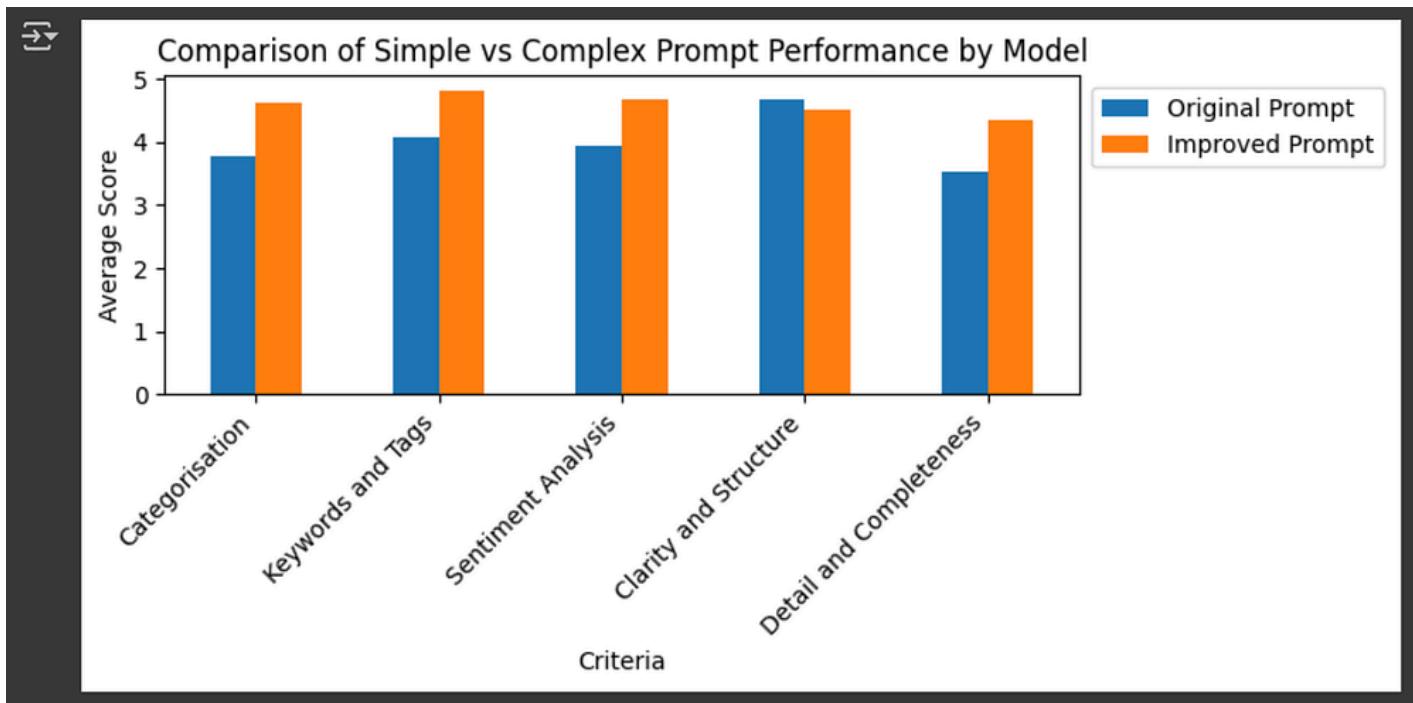
# Calculate average scores for each criterion
criteria = [
    'Categorisation',
    'Keywords and Tags',
    'Sentiment Analysis',
    'Clarity and Structure',
    'Detail and Completeness'
]

# Calculate average scores for each criterion by model
simple_avg_scores = df['simple_scores'].apply(pd.Series).mean()
complex_avg_scores = df['complex_scores'].apply(pd.Series).mean()

# Prepare data for plotting
avg_scores_df = pd.DataFrame({
    'Criteria': criteria,
    'Original Prompt': simple_avg_scores,
    'Improved Prompt': complex_avg_scores
})

# Plotting
ax = avg_scores_df.plot(x='Criteria', kind='bar', figsize=(6, 4))
plt.ylabel('Average Score')
plt.title('Comparison of Simple vs Complex Prompt Performance by Model')
plt.xticks(rotation=45, ha='right')
plt.tight_layout()
plt.legend(loc='upper left', bbox_to_anchor=(1, 1))
plt.show()
```

Below the results...



Mentions by Author

- [Where AI Meets Language | Language Models, AI Agents, Agentic Applications, Development Frameworks & Data-Centric...](#)
- https://platform.openai.com/docs/api-reference/chat/create#chat-create-reasoning_effort