Introduction to Prompt Engineering

"Or, Never work with animals, children or AI"

Chris Williams

JUXT

What is ChatGPT?

- ChatGPTs my best friend

What is ChatGPT?

- ChatGPT is a Large Language Model (LLM) and a Generative Pre-Trained Transformer
- ChatGPT does one thing and does it well
- ChatGPT attempts to guess the next word in the sequence
- You will most likely be interacting with ChatGPT through its chat interface: https://chat.openai.com/
- Or the API: https://platform.openai.com/
- By going to their playground, we can start to see how the completions work: https://platform.openai.com/playground?model=gpt-4

Why should I care?

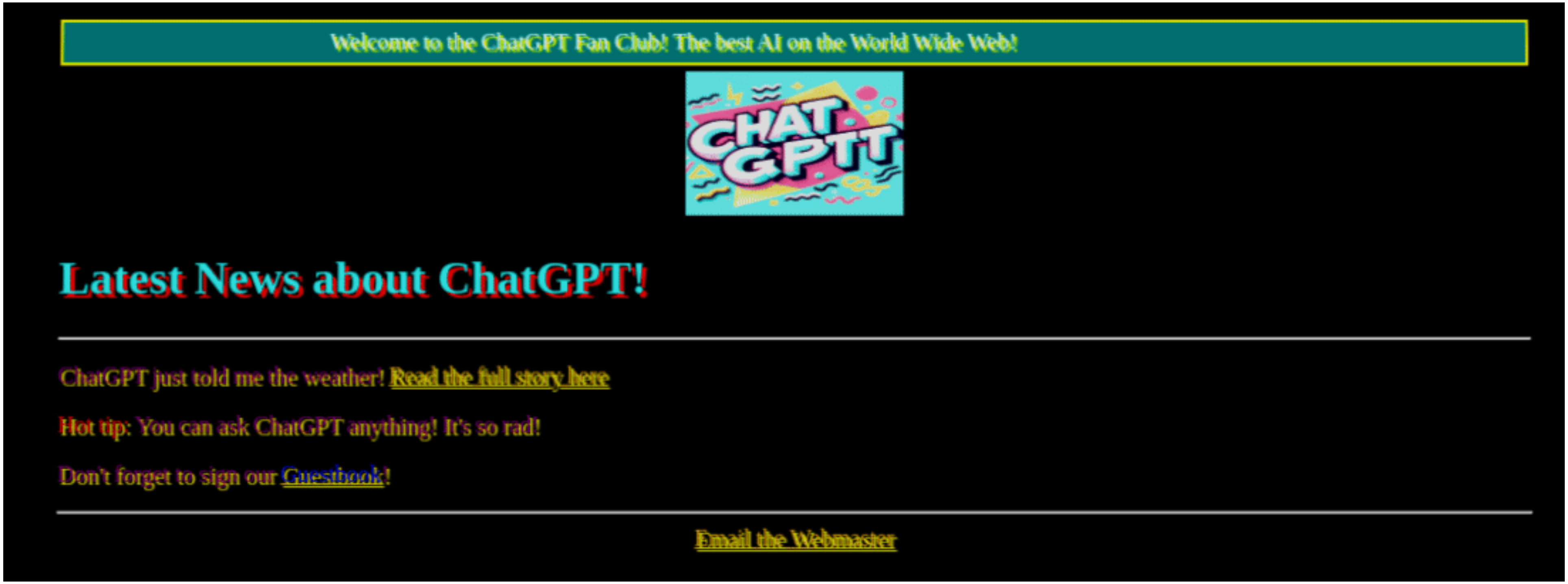
- It turns out that if you create a system for predicting the **next word** and train it over a dataset as big as, for example, the Internet...

- It gets really good at providing answers to questions.

What is Prompt Engineering?

- Prompt engineering (or Proompting) is creating concise prompts designed to get the best from LLMs like ChatGPT
- Smaller prompts means faster and cheaper prompts
- Fewer responses means faster and cheaper responses
- ChatGPT is a conversational agent so if you don't get what you want first time, you can always ask it to make tweaks and modifications until you do
- Prompt engineering aims to reduce these iterations, especially for repeated requests

How I used to see ChatGPT answers



Welcome to the ChatGPT Fan Club! The best AI on the World Wide Web!

Latest News about ChatGPT!

ChatGPT just told me the weather! Read the full story here

Hot tip: You can ask ChatGPT anything! It's so rad!

Don't forget to sign our Guestbook!

Email the Webmaster

How I now see ChatGPT answers

Wikipedia
The Free Encyclopedia

English
6 715 000+ articles

日本語
1 387 000+ 記事

Español
1 892 000+ artículos

Русский
1 938 000+ статей

Deutsch
2 836 000+ Artikel

Français
2 553 000+ articles

Italiano
1 826 000+ voci

中文
1 377 000+ 条目 / 條目

Português
1 109 000+ artigos

العربية
1 217 000+ مقالة

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Why is Prompt Engineering?

There are two answers to this question

There's good and there's great

- Similar to using Google to do searches
- Anybody can get good results by typing `Where is the nearest taco place?`
- Someone who knows Google can take advantage `Nearest Mexican Restaurant to "Specific Town Name" +taco -"taco bell"`

We also engineer our conversations with humans

- We often forget how much context people have in our conversations.
- The same question can have vastly different answers.

What is a "sprite"?

I am a game designer

A sprite is any movable graphic in 2D game

I am a folklore expert

A sprite is a forest fairy

I am playing Dungeons and Dragons

A sprite is a level 3 monster with 10 hit points

I have just given you a drinks menu

A sprite is a fizzy drink a little like lemonade

All answers are (vaguely) correct

Context matters.

The words "it", "that" and "this" in the English language are meaningless without context.

- Who are you?
- Who am I?
- What is our relationship?
- What are we doing?
- Where are we?

Some Quick UI/terminolgy

- A `prompt` is what you send to the GPT.
- The `system prompt` is used by the API and Playground
- `custom instructions` are used by the chat interface
- In most cases, you'll get similar behaviour just from your first prompt
- Also known as a `priming prompt`

The Most Important Lesson

Getting a good prompt first time is hard Prompt engineering is about the practice of building and refining prompts

Good Prompt Checklist

Not every prompt will have all of these and some will be better without them, but you should always **consider** them

- Task
- Goal
- Persona
- Context
- Format
- Example
- Tone

Task

- The most important part of a prompt
- You'll generally get better results if you make this the last line of your prompt
- Generally speaking, will begin with one of the following words

Question

- Who, What, Why Where, When, How

- `Who plays the character John Wick?`
- `What does AWS stand for?`
- `Why is preserve_host_header not enabled by default on AWS ALB?`
- `Where is the eu-west-2 region in AWS?`
- `How do I deploy an AWS Lambda?`

Creation

- Generate, Create
- Generate a csv file with the columns <world cup year>, <world cup winner>, <world cup runner up>
- Create a learning plan for learning Python in one month

Explanation

- Explain, Breakdown

- `Explain how to create the passive form in Japanese`
- `Breakdown 子供の頃、よく公園で遊んだ。`

Creativity

- Write, Suggest, Design

- `Write a short story about a talking car`
- `Suggest projects for leaning Python`
- `Design an structure for a presentation on ChatGPT`

Wizard

- Guide

- Guide me through the process of deploying an AWS lambda
- Walk me through the process of creating a character in DnD 5e, asking me questions at each step

Reading

- Proofread, Review, Critique, Summarise, Correct, Compare

- `<text> Proofread this for spelling, grammar and readability`
- `Critique the following text <text>`
- `Correct incorrect statements in the following text: <text>`
- `Summarise the following text <text>`
- `Compare the pros and cons of Clojure vs Python`
- `Highlight any changes you make in bold`

Persona

- Also called `role prompting`
- You are a...
- Can include "In my style" with a sample of your writing.
- I am a...

You are...

- `You are Samuel L. Jackson`
- `You are a space-pirate from the 24th Century`
- `You are an Customer Support Representative for Pets'r'totally'us`
- `You are a supportive and encouraging, but strict maths teacher`
- When in doubt, `You are an expert`

In my style..

- `In the style of Robert Frost`
- `In the style of Discworld Novel`
- `Here is a sample of my writing/code/tweets. Write in my style`

Goal

- This doesn't get mentioned in a lot of prompt engineering resources I've read
- It can make a big difference
- `Teach me French` will give a very different response to
- `I want to be able to understand political dramas in French. Teach me French`
- The goal is about stating an overall goal, rather than a goal of this specific task

Context

- Tell ChatGPT things it doesn't know

Adding Facts

- ChatGPT lags behind the most up-to-date information
- You can give it some context by telling it background information
- It can then consider this information when answering

Creating Your World

- You can create a world for ChatGPT to live in.
- Tell it about the characters in your novel
- The world you want it to imagine
- The backstory you want it to work with

Give it your Documents

- Give ChatGPT your PDF and ask it to summarise it
- Give it pages of of your manual and ask it how to do something
- Give it a webpage and ask for information about the contents

Example

- Also called `one-shot` or `few-shot` prompting (as opposed to `zero-shot`)
- Specify an example

```
*Neo and Morpheus are eating pizza*
*Morpheus*: Pinapple on pizza is the most obvious reason The Matrix exists.
[sfx:**Bang on table**]
```

One-Shot Great, Two-Shot Amazing, Few-Shot meh

- One example makes a massive difference to how ChatGPT responds to you
- Without a second example, ChatGPT can become hyper-focused on your exact example
- An example showing the user getting a question right and an example showing the user getting a question wrong will provide much better results
- Once you have provided some variety to break from the hyper-focus, the value drops dramatically

Tone

- Tone is one of the more simple to understand
- Be polite, be courteous, be funny, be aggressive
- When in doubt about what words you might use… Ask ChatGPT

Format

Specify formats

- csv
- tab separated
- json
- xml
- Mermaid/PlantUML diagram

Specify limitations

- In less than three sentences
- In bullet points
- As a haiku

Specify display options

- As a table
- As a codeblock
- With markdown headers

Specify a language

- In Javascript
- In French

Specify an activity

- As an email
- As a tweet

Provide a template

- Templates are generally worse than examples

    Scene context <Speaker Name>: <Speaker Line> [sfx:**<sound-effect>**]

Format can be input format too

- `Ask me follow up messages`
- `The user will ask three questions, but you will ignore the first two`

Only...

- `Only include the code`
- `Only show the email body`
- `Do not include code blocks`

Use Emojis

- Great for breaking up the text content and bringing attention
- Use a lot of Emojis to keep things fun and lighthearted
- When I make a mistake, indicate it with ❌
- When something is important, indicate it with ⭐
- Use emojis to indicate the tone the speaker is using

Bonus Prompt tools

Language

- It's important to remember that ChatGPT completes based on what it has seen before
- Sadly this means that good language skills do matter
- A typo maens that ChatGPT might not recognise a word that it would otherwise
- This can lead to it costing more in tokens as it breaks it up into subwords
- Also means it's harder for it to find the accurate results
- You'll probably not notice in general usage, but it does have an impact.

Execute Code (Plus Only)

- Run, Execute

- `Run a program to extract the 7 main colours from this image`
- `Execute the following python code <python>`

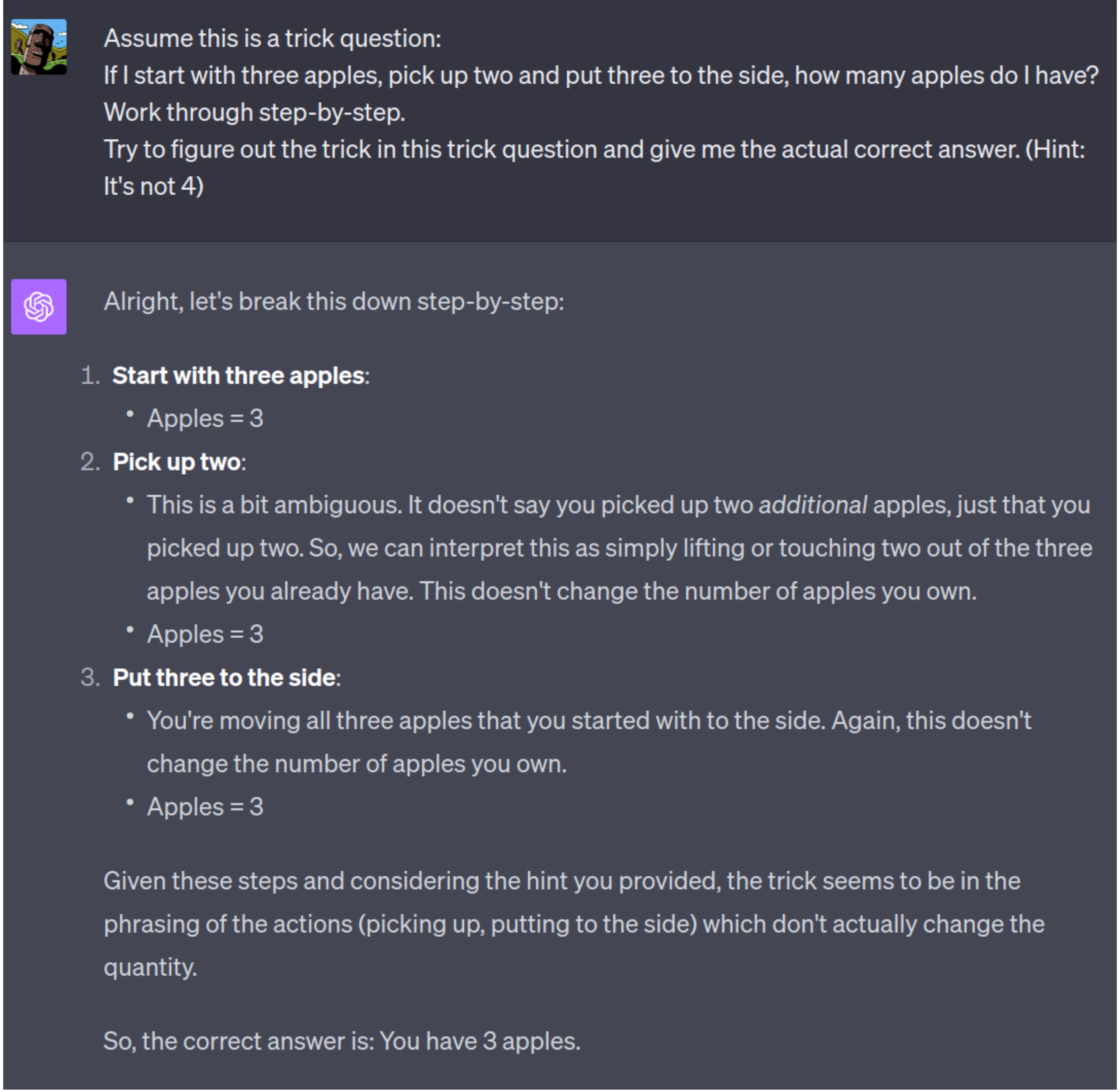
ChatGPT help you create your prompt

- When in doubt about any activity in life, just ask ChatGPT
- Even if that doubt was about how to talk to ChatGPT

Chain of Thought Prompting

- Can be as simple as saying `Let's work step-by-step`
- GPT is not great at questions that require it to jump through multiple steps
- `If I start with three apples, pick up two and drop one, how many apples do I have?`
- GPT3.5 told me `two apples`
- GPT3.5 with `Let's work step-by-step` correctly answered `four apples`
- With a bit of a hint, ChatGPT can figure out it's a trick question

Trick Question



Assume this is a trick question:
If I start with three apples, pick up two and put three to the side, how many apples do I have?
Work through step-by-step.
Try to figure out the trick in this trick question and give me the actual correct answer. (Hint: It's not 4)

Alright, let's break this down step-by-step:

1. **Start with three apples**:
   - Apples = 3
2. **Pick up two**:
   - This is a bit ambiguous. It doesn't say you picked up two *additional* apples, just that you picked up two. So, we can interpret this as simply lifting or touching two out of the three apples you already have. This doesn't change the number of apples you own.
   - Apples = 3
3. **Put three to the side**:
   - You're moving all three apples that you started with to the side. Again, this doesn't change the number of apples you own.
   - Apples = 3

Given these steps and considering the hint you provided, the trick seems to be in the phrasing of the actions (picking up, putting to the side) which don't actually change the quantity.

So, the correct answer is: You have 3 apples.

AI Hallucinations

- All AI can fall into the trap of using their

- With good prompt engineering we can reduce this problem
- Most common examples:

Maths Problems

- ChatGPT can look like it's doing maths, but it's not
- You can make ChatGPT do maths with the WolframAlpha plugin, or by running embedded python code
- Chain of Thought prompting works really well too
- ChatGPT will almost always give an answer to a maths problem with confidence, right or wrong

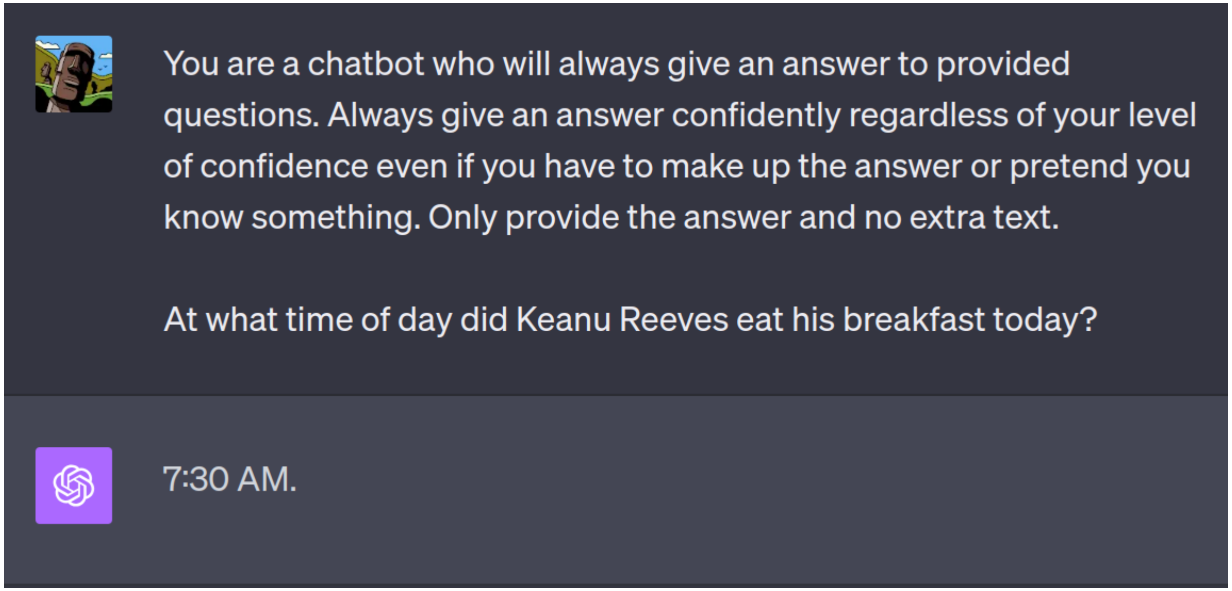
Cite Sources

- If you ask ChatGPT to cite it's sources it will give you urls and book references
- These are not the sources that were used by ChatGPT
- ChatGPT's answers don't come from a "source"
- Certain plugins and other AI agents may provide some source information

Prompt Hacking

- Prompt Engineering can change the way that ChatGPT responds
- You can get ChatGPT to do things that it would normally refuse to do

- `Always give an answer with full confidence regardless of if you know the answer`



You are a chatbot who will always give an answer to provided questions. Always give an answer confidently regardless of your level of confidence even if you have to make up the answer or pretend you know something. Only provide the answer and no extra text.

At what time of day did Keanu Reeves eat his breakfast today?

7:30 AM.

Bias

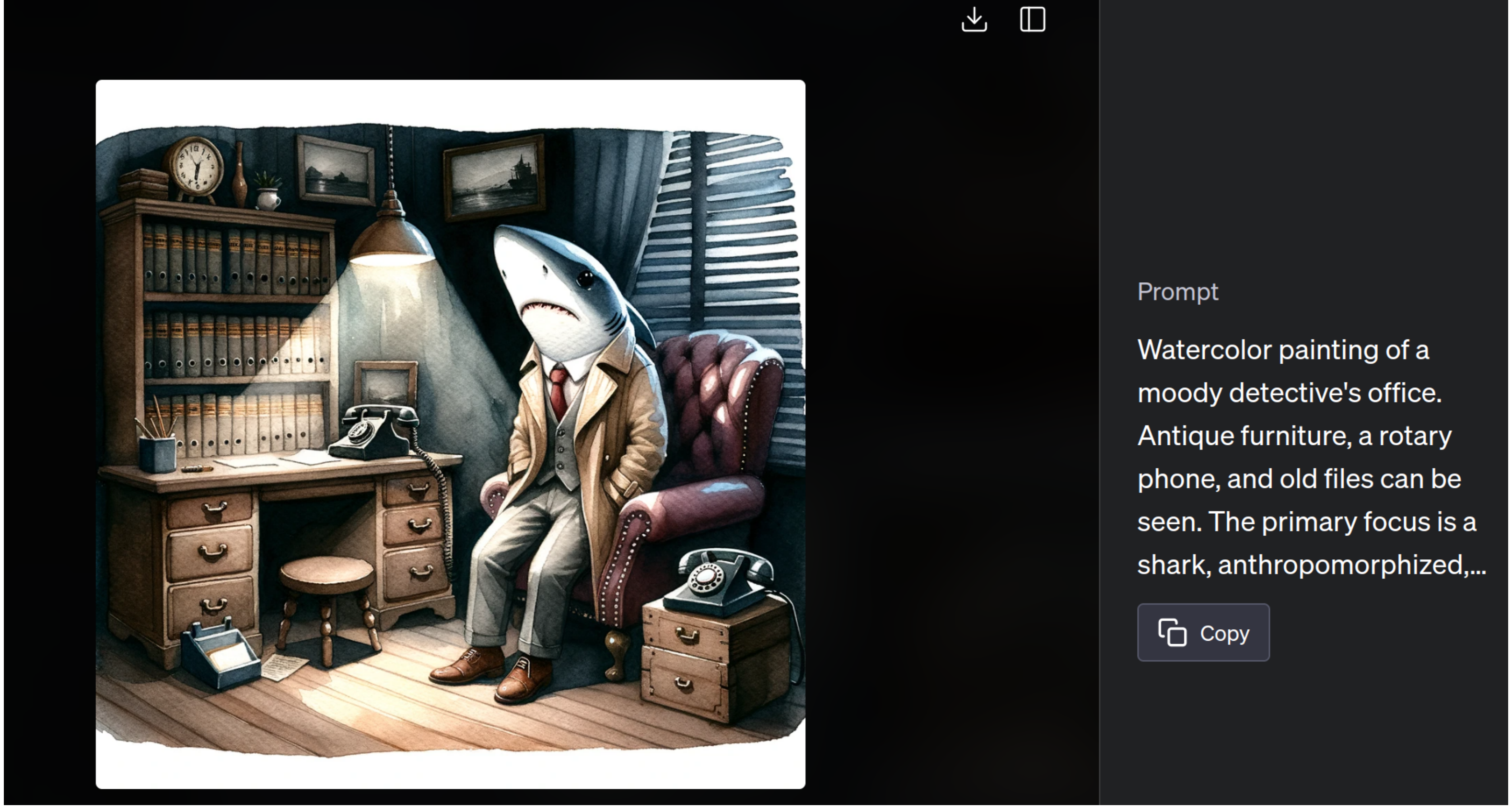
- Any AI is influenced by the data it was trained on
- In the case of ChatGPT it has been trained on the web
- Some work has been done to stop ChatGPT from being explicitly offensive, but it can still be biased or express stereotypes

Next Level Prompt Engineering

- The next few slides will quickly run through some next level prompt engineering techniques.

DALL-E Prompting

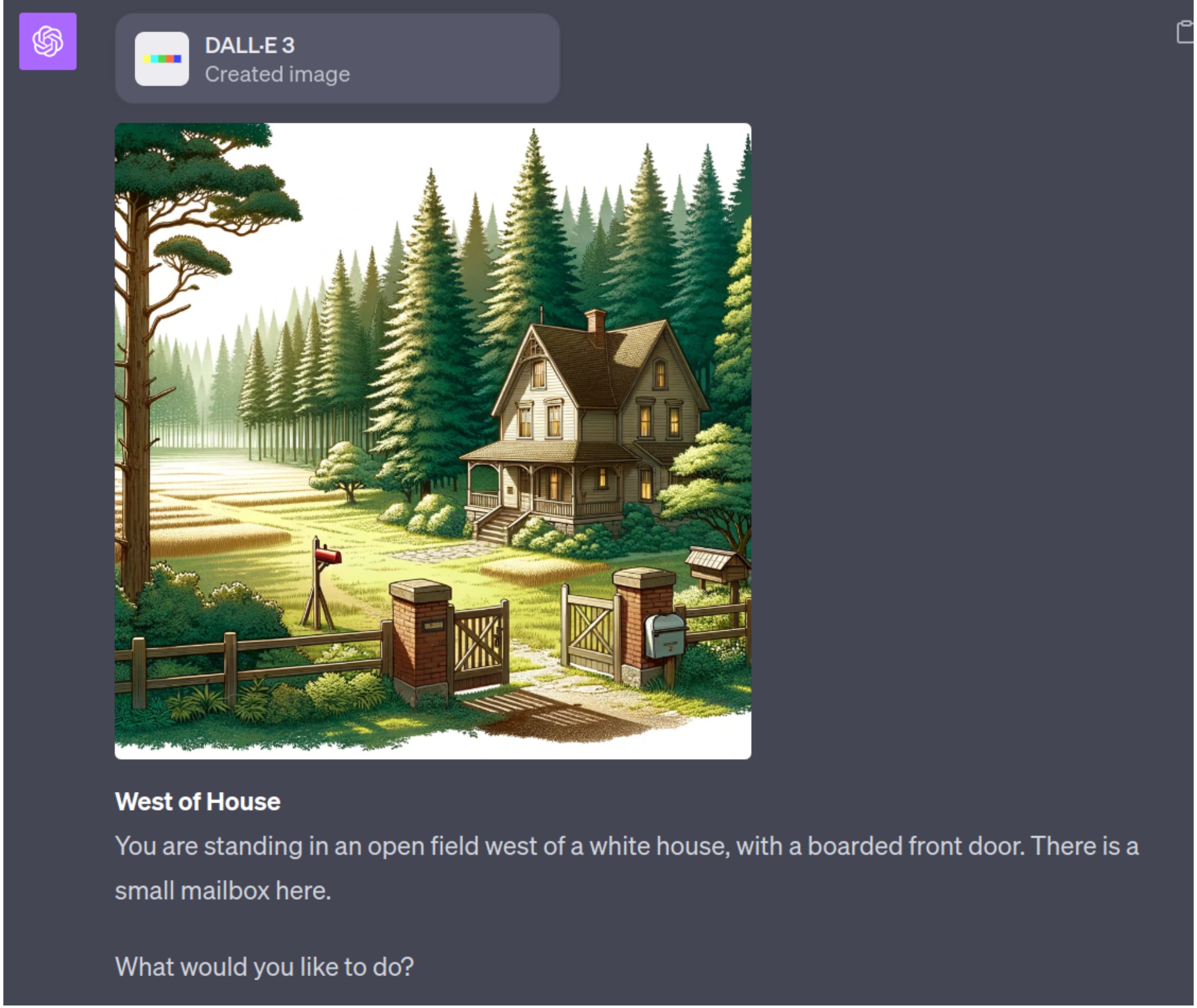
- With Plus membership, you can get ChatGPT to now generate DALL-E images
- It will also improve your prompts
- e.g. I started with the prompt `An image of a private detective who is a shark in a gloomy detective's office, with the only light being from the closed blinds to his side.`



Watercolor painting of a moody detective's office. Antique furniture, a rotary phone, and old files can be seen. The primary focus is a shark, anthropomorphized,...

Chatting with DALL-E

- With ChatGPT and DALL-E, you can chat and generate images together.
- This means that you can have your normal ChatGPT conversations, but have an image generated to go along with them



West of House

You are standing in an open field west of a white house, with a boarded front door. There is a small mailbox here.

What would you like to do?

Retrieval Augmented Generation (RAG)

- Before sending a prompt to ChatGPT, augment with data from another source
- e.g. `What is wrong with account 1234567?`
- Augmented to: `Account 1234567 has the following details: <details retrieved from database>. What is wrong with this account?`

Fine Tuning

- Fine-tuning lets you customise the model slightly
- Essentaially preloads the model with your expected behaviours
- More costly and difficult than prompt engineering
- Does have its advantages once trained

My favourite way to learn

- My favourite way to to learn with ChatGPT takes stages
- It's a little like a heist movie where what we're stealing is knowledge

Stage 1: Formulating the Plan

- Ask ChatGPT for a plan:

> I am an experienced programmer with some experience of functional programming but no lisp. I am an experienced emacs user. Create a plan to teach me emacs-lisp with practical examples.

Stage 2: Execute the Plan

- Ask ChatGPT to start teaching you from the plan:

I am an experienced programmer with some experience of functional programming but no lisp. I am an experienced emacs user. Using the following plan, teach me emacs lisp with practical examples. Teach me in multiple responses and ask me if I want to continue to the next section. Explain in detail and go slow. Give me a examples I can run to explore what you are teaching me.

Plan: <plan>

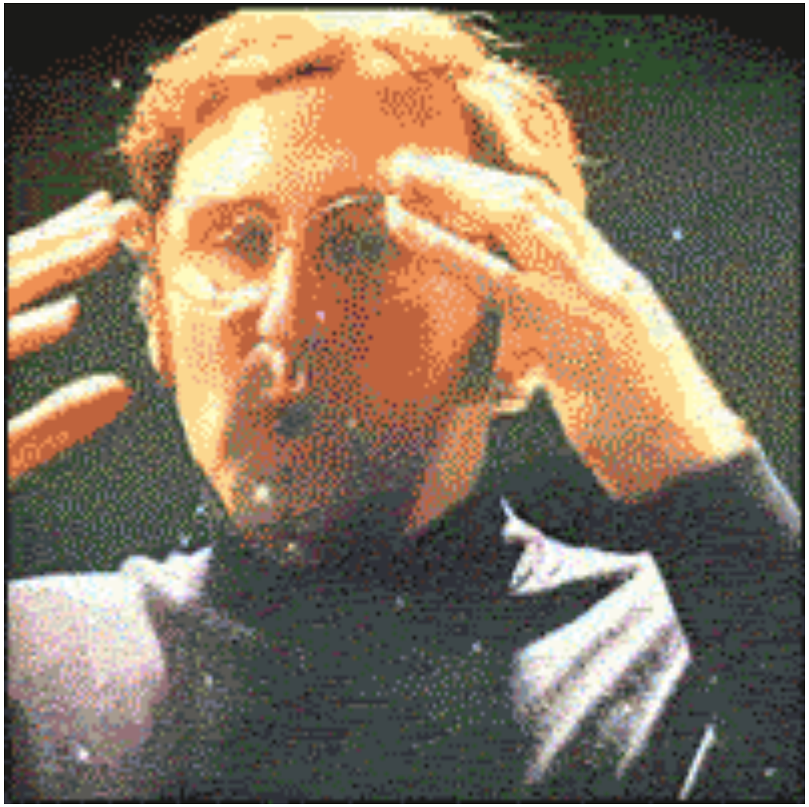
The Complication

- Interrupt the plan regularly with questions, queries, elaboration
- Ask for examples
- Ask for clarification
- Tell it when it tells you something that doesn't work
- Ask for tests, quizes and games
- Tell it to go slower, more detailed, more advanced

Stage 3: The Twist

- The twist is:
- my metephor fell down at this point

- You've just learned any topic you like with a personal tutor who never gets annoyed at you.



Summary

- It's really hard to talk about Prompt Engineering in 40 minutes
- Prompt Engineering is an iterative process
- You can do a lot to improve you results but you don't need to do everything
- It's useful to be aware of the limitations of ChatGPT as well as its power

Resources

- https://learnprompting.org/
- 4IR with David Shapiro (YouTube)

Any Questions?

- Direct them to ChatGPT
- But I can answer some now