

AI for Java developers

how to create responsible value

Johan Hutting
March 29th, 2023



do your thing

./whoami

Johan Hutting

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Main focus on JVM technologies, but also interested in game design and Artificial Intelligence: my chess program participated in the Dutch championships.



A photograph of two men in an ornate room, likely a cathedral or church, characterized by large white marble columns and warm, golden lighting. One man, on the left, has curly red hair and a beard, wearing a dark blue textured blazer over a white shirt. The other man, on the right, has dark hair and a beard, wearing a brown leather jacket over a blue patterned scarf. They are engaged in a handshake, with both smiling. In the top left corner of the image, there is a bright orange rectangular overlay containing the word "Introduction".

Introduction

What will you learn

- No doom & gloom
- Modern, promising A.I. technologies to apply
- The benefits you'll gain with them
- Which elements to take approach with caution

An aerial photograph of a rural landscape under a blue sky with white clouds. In the foreground, there's a green field with dark, parallel tracks from a tractor. Next to it is a narrow, rectangular body of water, possibly a canal or irrigation ditch, surrounded by green grass and some brown, dry vegetation. To the right of the water is a large, yellowish-brown field that has been recently harvested, showing distinct rows. The background shows more fields stretching towards the horizon under the same cloudy sky.

Generative pre-trained transformers

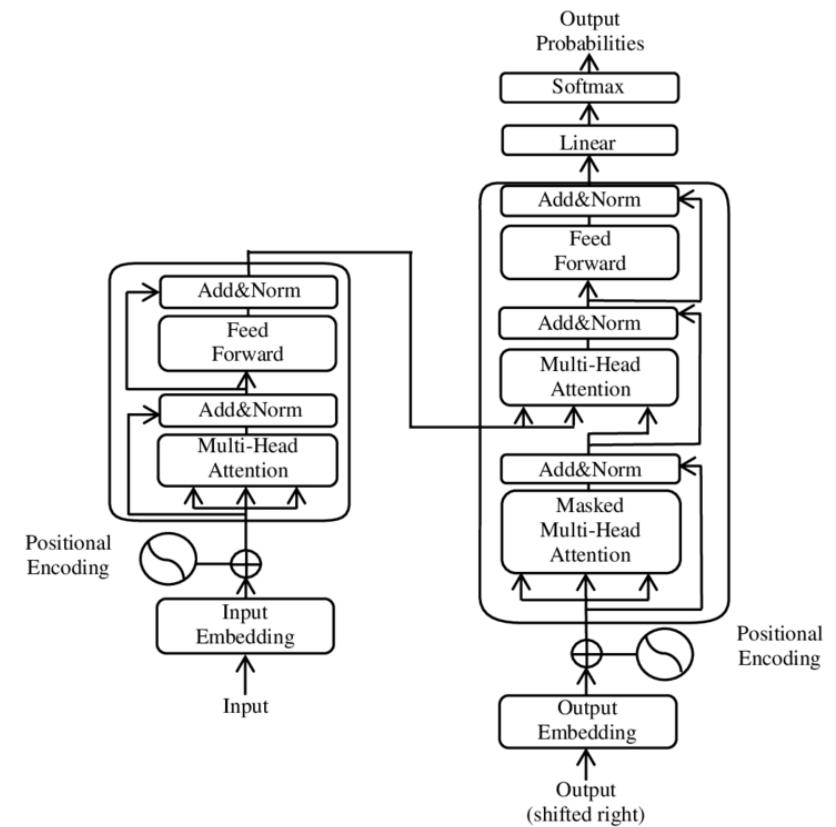
AKA: GPT-4, ChatGPT

Transformers

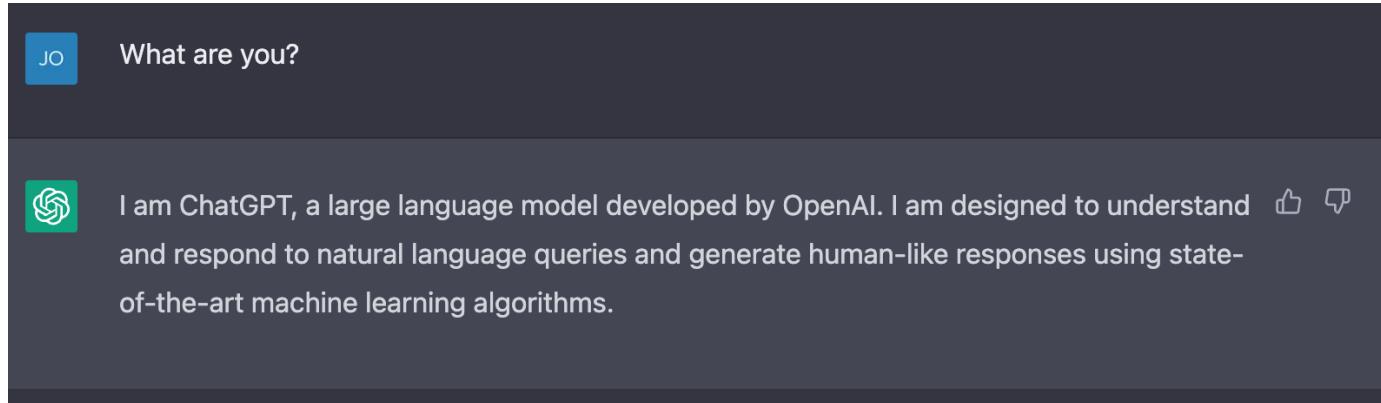
The transformer A.I. architecture was published by **Google Brain** in 2017.

From 2018 onwards this has increasingly become popular for *Natural Language Processing* and *Computer vision* A.I. tasks.

Main benefit: parallel processing of very large datasets while maintaining context.



OpenAI's ChatGPT



ChatGPT can

- Supply the key points of a TLDR; text (or book)
- Explain a subject and allow you to ask for clarifications on specific parts
- Give suggestions for names or concepts
- Support with poetry and writing targeted explanations
- Act as a call center client tracking context of your questions and responses
- Generate plantUML diagrams for your descriptions
- Supply designs for websites
- Generate code examples for your challenges



Feedback loop on challenges

JO

Give me five examples for the coding challenge



Sure, here are five potential coding challenges for a senior Java engineer:



1. Implement a concurrent data structure: Ask the candidate to implement a concurrent data structure such as a concurrent hash map or a concurrent linked list. This challenge is designed to test the candidate's understanding of multithreading, synchronization, and concurrent programming.
2. Build a RESTful API: Ask the candidate to build a RESTful API using Java and a web framework such as Spring or JAX-RS. The API should allow users to create, read,

JO

Give me five examples that can be finished in half an hour



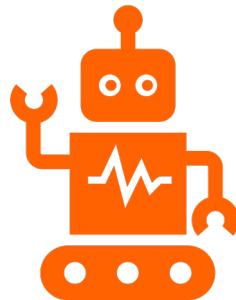
Sure, here are five potential coding challenges that can be finished in half an hour for a senior Java engineer:



1. Reverse a string: Ask the candidate to write a Java method that takes a string as input and returns the reversed string. This challenge is designed to test the candidate's understanding of basic string manipulation and Java syntax.
2. FizzBuzz: Ask the candidate to write a Java program that prints the numbers from 1 to

ChatBots!

Who loves to talk to a company chatbot when you have a question?



Current chatbots are very restrictive as they are predesigned around a flow-diagram.



A GPT-AI with the proper domain and customer knowledge will be more effective to come to a solution.

Generating designs

Plantuml through chatGPT is easy to achieve by asking for the code and supplying:

- A topic
- Description of the model

JO I want to generate a UML diagram for the following, please provide the plantUML code for this:
topic: simple task storage
description: user can add tasks to the database and can retrieve them, ordered by date

Sure! Here's the PlantUML code for a UML class diagram that represents the simple task storage system you described:

```
python
@startuml
class Task {
    -id: int
    -description: string
    -dueDate: date
}

class TaskStorage {
    +addTask(task: Task): void
    +getTasksByDate(): List<Task>
}

Task --> TaskStorage
@enduml
```

In this diagram, there are two classes: `Task` and `TaskStorage`. `Task` has three private attributes (`id`, `description`, and `dueDate`), which represent the unique identifier, description, and due date of a task, respectively. `TaskStorage` has two public methods (`addTask` and `getTasksByDate`), which allow users to add tasks to the database and retrieve them ordered by date, respectively.

(Ab)use on tests

As shown earlier one can ask ChatGPT to generate tests for an interview...
But the interviewed can also use ChatGPT to figure out the solutions faster!

On a positive note, you can also generate a list of test subjects with ChatGPT to practice.

Evaluation

Keep in mind the results are based on a probability matrix, not on logic!

You'll still need to correct the output quite often, despite the A.I. responding with authority.

JO Can you give me ten anagrams of connect.frl and their meaning

Sure, here are ten anagrams of "connect.frl" with their meanings:

- 1. Cornet.cfl - A cornet is a musical instrument similar to a trumpet.
- 2. Front.clce - The front is the part of something that is facing forward, and "clce" is not a word in English.
- 3. Lorentc.cfc - "Lorentz" is a reference to the Dutch physicist Hendrik Lorentz, who made significant contributions to the development of electromagnetism.
- 4. Clencetrof. - Not a word in English.

A photograph of a man with light brown hair, a beard, and glasses, wearing a grey hoodie. He is looking down at a laptop screen. In the background, two other people are working at desks with laptops. One person is wearing white headphones. The scene is set in an office environment.

A.I. code generation

Co-pilot, CodeWhisperer, ...

Rubber Ducky pair-programming

Consider the A.I. as a pair programming rubber duck.

This is mostly identical to autocomplete in IntelliJ, but with more context regarding your code.

You'll still need to pay attention, quite often wrong solutions are provided. You can even end up with missing braces or other forms of code that doesn't even compile.



Copilot



GitHub Copilot originally launched in 2021 as an intelligent code completion companion. Main features:

- Supports multiple languages
- Auto-complete suggestions for lines of code as well as complete methods
- Generate code based on comments

On March 16th Microsoft 365 Copilot was announced offering identical solutions for the Office suite, such as Outlook, Word and PowerPoint.

Concerns

The quality is so-so, you still must correct code quite often.

Keep in mind that you share your local code with GitHub when you don't use the enterprise version of Copilot.

There are lawsuits regarding the use of open-sourced code for training.

Codewhisperer

Amazon's answer to Microsoft's GitHub Copilot: trained on both open source and curated internal Amazon code.

Free for now, likely licensed in the future.

Quality seems better than Copilot on Java and Kotlin code (fewer mistakes).

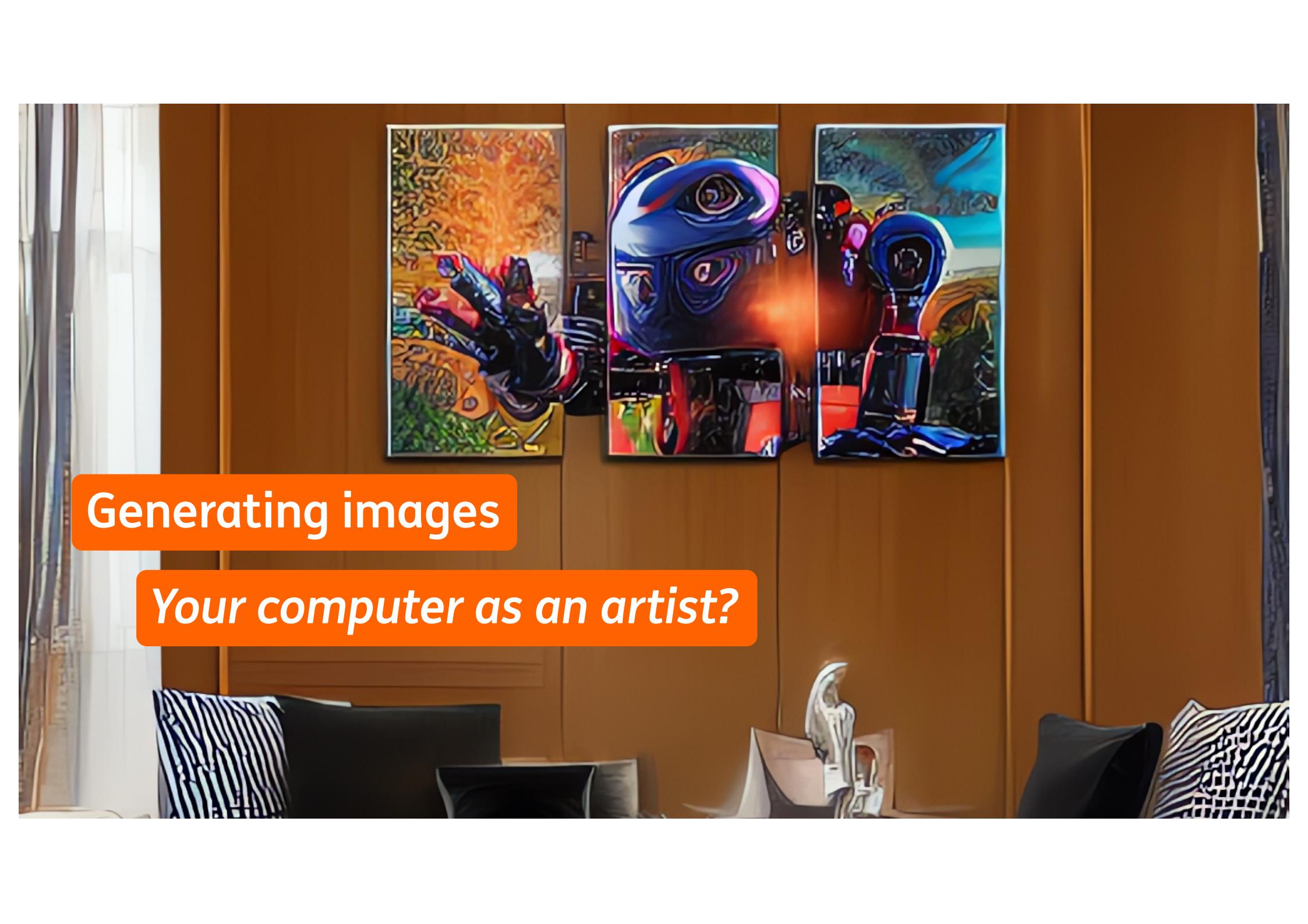
The aforementioned concerns with Copilot also apply here.

Evaluation

Promising support technology, but:

- Are you allowed to share domain knowledge outside your organisation?
- Are you allowed to share code outside your organisation?
- Can you remain focussed on auto-generated boring code?
- How will the juniors learn and improve their craft?

Regarding the use during interviews: Also keep in mind that you don't fully block the usage of these on intake tests if you are ok with people using them.



Generating images

Your computer as an artist?

Stable diffusion

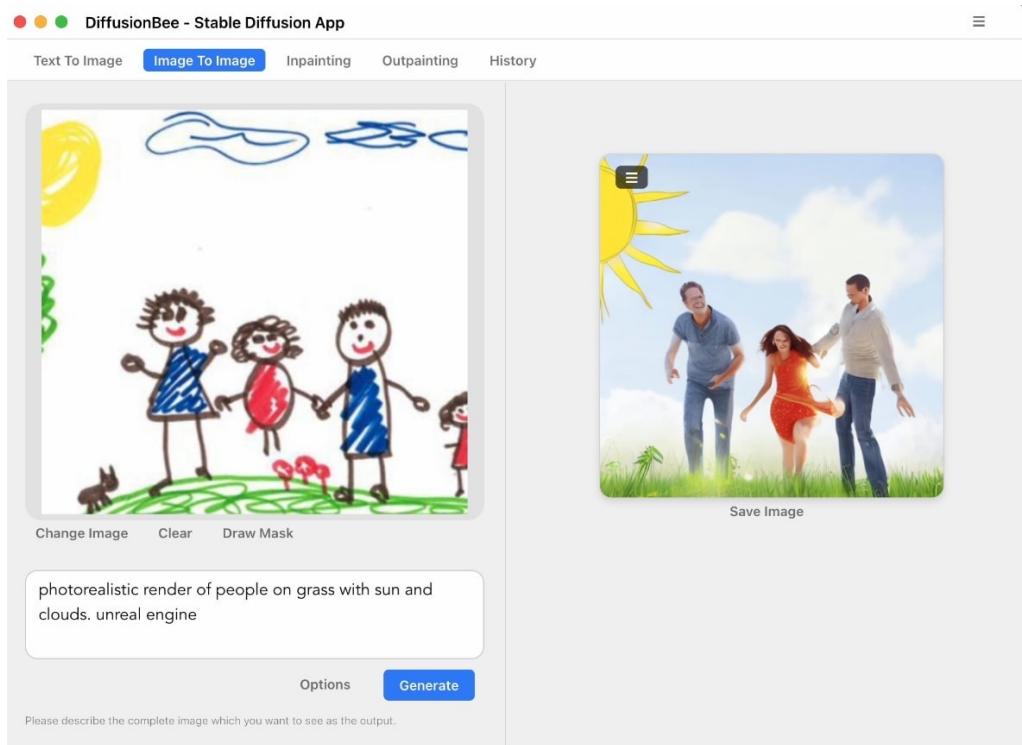
Open sourced A.I. image generation on your local hardware.

It runs as a python script or with a GUI such as Diffusion Bee.

Stable Diffusion also allows you to apply and extend your own trained set, for instance with your own art or stock photo's (*assuming you have permission*)

If you don't have fast enough hardware, it is also available online:

<https://huggingface.co/spaces/stabilityai/stable-diffusion>



Dall-E / MidJourney

Closed-source image generation in the cloud.

DALL-E by OpenAI has been available since 2021 and uses GPT-3 under the hood. It is trained with images found on the internet. Initial use is free, paid per month after you reach a threshold

Midjourney creates more “artsy” output. It is closed source but seems to use Stable Diffusion with specific art in it’s training set. You can generate 25 pieces of art for free with prompts on their Discord, after that you’ll need to pay.

Evaluation

Copyright and usage rights is the main issue. You risk expensive court cases when you use someone else's art or photographs without permission.

Can we use this for developers?!
To design logos and user interfaces or
should we stick to ChatGPT?

The screenshot shows a ChatGPT interface. The user (JO) asks, "Can you generate a view to add tasks?" ChatGPT responds with a simple example of a view in markdown:

```
markdown
-----
| Add New Task |
-----
| Task Name: | [ ] |
| Description: | [ ] |
| Due Date: | [ ] |
| Priority: | [ ] |
| ( ) Low | [ ] |
| ( ) Medium | [ ] |
| ( ) High | [ ] |
| [Add Task] | -----
```

At the top right of the code block, there is a "Copy code" button and a thumbs-up/thumbs-down icon.

A photograph of a person sitting at a desk, viewed from behind. They are looking at two computer monitors displaying lines of code. The person has their hands on their head in a gesture of stress or despair. On the desk, there is a white mug, a gold-colored water bottle, and some papers. The background shows a window with a view of a building.

Pitfalls

Bias and other unwanted side-effects

Bias

As the GPT models are scored by probability bias will be introduced by the dataset. People are biased too, but unlike an algorithm they can overcome this by themselves.

Applying nuance and rational logic still requires a ‘human touch’.

Correcting the dataset can potentially create new bias (as well as censorship complaints afterwards). Before you create your own set, test it well!

Other unwanted side-effects

Stack overflow banned A.I. submissions as it is considered harmful.

Education and academics are running into challenges

The uncanny valley: is the contents of the mail you received real or generated?

Responsibilities of generated text and code: *you* are the owner

Copyrighting generated art is (at the moment) not possible.

A photograph of a man with white hair and a beard, wearing a blue t-shirt, sitting in the open driver-side door of a white Land Rover. He is smiling and giving a thumbs-up. The Land Rover is heavily loaded with luggage, including several coolers (blue, green, white) and bags, tied down on its roof. The vehicle is parked in front of a large, light-colored stone wall with some tropical foliage like palm fronds in the foreground.

Takeaways

Takeaways



Be vigilant



Experiment



Create value

A photograph of a man with curly, reddish-brown hair and a beard, looking upwards with a thoughtful expression. He is wearing a dark grey blazer over a white shirt. The background is dark, with a bright light source visible above him, creating lens flare effects. A vertical wooden beam is on the right side.

Questions?

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