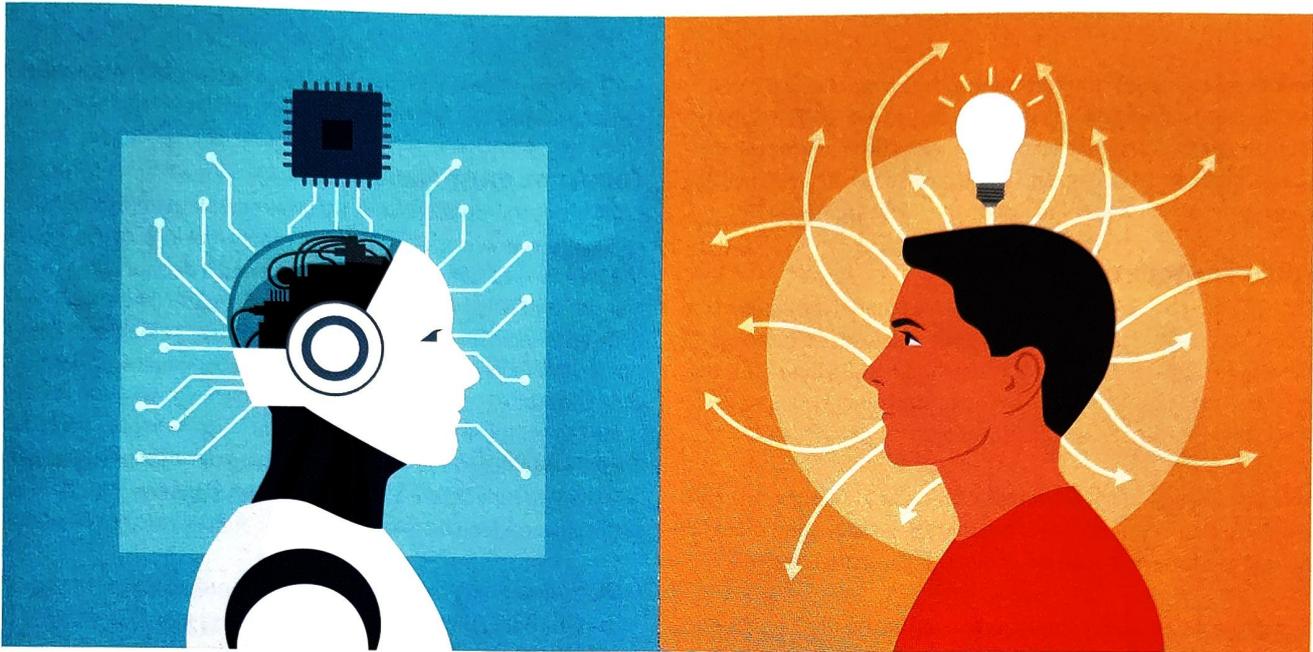# JAVA{ MAGAZINE

JAVA IS THE WAY TO GO All you need!

> **BUILD YOUR OWN** JVM LANGUAGE

> **THE IMPACT OF** ARTIFICIAL INTELLIGENCE

> **HOW TO CONTRIBUTE** TO OPEN SOURCE

> **FROM UNSTRUCTURED** TO STRUCTURED CONCURRENCIES

THE IMPACT OF AI

This is not an article about how to use AI. Instead, let's talk about whether you should be using it in the first place. I don't answer that question here. Instead, I will raise some issues with AI, widening the scope in each section. I will let you decide for yourself whether or not these issues resonate with you. I just want you to be aware of them.

V

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{ IMPACT ON YOURSELF }

Let's start with a quote:

"I've come up with a set of rules that describe our reactions to technologies:

• Anything that is in the world when you're born is normal and ordinary and is just a natural part of the way the world works.
• Anything that's invented between when you're fifteen and thirty-five is new and exciting and revolutionary and you can probably get a career in it.
• Anything invented after you're thirty-five is against the natural order of things."

Douglas Adams, 2002.

Coincidentally, I'm 42 years old as I write this, but I don't want to act like a 35-year-old. Especially during the ChatGPT hype earlier this year, AI was exciting and shiny and terrifying. I lay awake at night convinced that not mastering ChatGPT would end my career within a few short years.

As I tried out GPT4, I felt super-productive, taking on new hobby projects that I didn't even dare try only weeks before. I learned Go, GNOME extensions, front-end. It was amazing. Now that the hype has passed a bit, I still find myself using ChatGPT almost daily. It's become a useful tool for me.

Meanwhile, I spoke to developers with opposing views. "I prefer to think for myself", is a comment that stuck with me (thanks Chris!).

And it's true: ChatGPT often gives incorrect answers which can lead to bugs and vulnerabilities. But it does so with extreme confidence, so your natural reaction might be to believe whatever it spits out without checking. And if you have to spend time checking every answer, isn't it easier to just do the thinking yourself?

{ IMPACT ON YOUR EMPLOYER }

ChatGPT, but also GitHub Copilot and most other AI tools, run in the cloud. You send them data, and they use that to give a response but also to train themselves. In the case of ChatGPT, this data is the prompts you type. In the case of Copilot and other coding assistants, it's the code in your IDE.

Your employer may not allow that, especially if you signed a confidentiality clause. Some code is classified as sensitive and shouldn't be sent to a foreign private cloud due to legal restrictions.

If you're not sure if your employer allows the use of AI tools, you absolutely (!) have to check before you start using one. And you need to be careful. Even if you've only installed Copilot to try it out that one time and haven't really used it since, it could still be running in the background, transmitting data.

ChatGPT is slightly safer, because you have to give it prompts. If you carefully consider what you're sending each time you use it, you may still be fine. But on the other hand, silly mistakes are

easily made. Raise your hand if you have never accidentally shared a password on Slack!

{ IMPACT ON OTHER PROFESSIONALS }

Copilot was trained on all code that was ever uploaded to GitHub, including code whose license doesn't allow that kind of use, like the GNU Public License (GPL). This has raised a debate about 'fair use' and whether or not it applies in this case. If humans are allowed to learn from reading GPL code, why not machines? Like humans, AI tools internalize their training set and come up with their own code.

Except when they don't. Copilot can sometimes reproduce code verbatim [1], especially if it comes from niche projects. This is explicitly forbidden by many licenses, including the GPL.

While licensing may seem trivial to you, it's deeply significant to those who apply these licenses, and they may feel compelled to stop maintaining their projects or remove them altogether, if AI models keep being trained on their code. That could potentially be a great loss to the open-source community.

A similar discussion occurred in the illustration world when AI image generators like DALL-E and Midjourney first appeared. People quickly discovered that they could generate images in the style of artists that they like. One of these artists, Greg Rutkowski, became the public image for this problem [2]. He has based his livelihood upon a specific skill that few people used to have. Now everybody can access it for free, which impacts his income.

By the way, there's a subtle but important difference between illustrators and developers whose work has been included in AI training sets. For developers, AI can be a productivity booster, allowing them to work faster. Companies aren't likely to fire developers because they can now do the same amount of projects with fewer developers; they're more likely to take on more projects at once with the same amount of developers [3].

Not so with illustrators. If a magazine needs an illustration, and an AI-generated image is good enough, they're more likely to spend a few bucks a month on a Midjourney subscription that they can use to generate many such images in a short time than they are to commission an artist like Greg Rutkowski who charges more than that monthly subscription for a single image [2]. Human copycats still have to acquire the skill, spend time painting, and feed themselves, so they don't have the impact that AI does.

{ IMPACT ON SOCIETY }

AI tools blur the line between fact and fiction. Sometimes it's harmless, like with that image of the pope in a puffer jacket [4]. However, ChatGPT has made it much easier and cheaper to produce
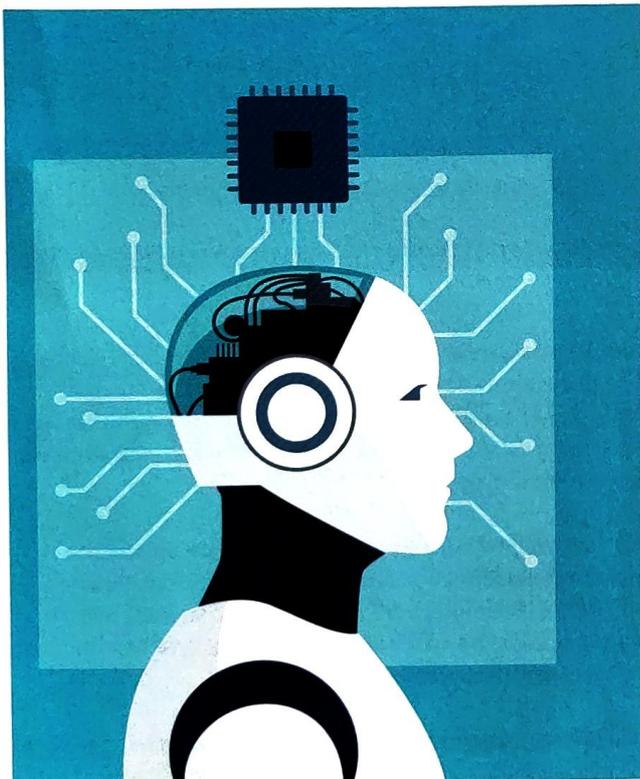
convincing disinformation at high volumes. Until we find a way to deal with this as a society, we'll have to be a lot more careful with the stuff we read online. Now more than ever, we cannot believe everything we read. This is a problem for you, but certainly also for the people in your life who read things online but aren't aware of this.

Another problem that was already present but became more prevalent with AI tools, is bias. Companies try to make their AIs as unbiased as possible, but as long as they're trained on the internet, bias will not go away. People on the right complain that certain voices are censored, such as that of Donald Trump. People on the left complain that certain voices aren't included in the training in the first place, simply because they publish fewer things online for AI tools to be trained on.

They both have a point, though the latter seems more problematic because it cannot be adjusted by tweaking the model after training. Furthermore, the models are trained on all of the toxic, sexist and racist things [5] that can be found in certain corners of the internet. This will come out occasionally, and you may not realize it.

In the meantime, students have started using ChatGPT to do their homework for them, and companies are discovering that it outperforms their employees in certain key areas. People have already lost their jobs to ChatGPT, and more will probably follow [6]. Until society comes up with solutions, these remain serious issues.

{ IMPACT ON THE WORLD }

The last issue I want to address is the energy-intensive nature of AI systems, both in training and usage. GPT3's training produced 5 million kg of CO_2 [7]. OpenAI hasn't disclosed GPT4's environmental impact, but it's certain to be more, since GPT4 is a much larger model. Additionally, a single ChatGPT query uses the same amount of energy as powering a lightbulb for an hour [8], and a single conversation spends about 500ml of water, used for cooling in data centers [9].

Of course, companies operating these tools can try to be carbon-aware by shifting computations to areas with abundant renewable energy, but these are generally the areas in the world where fresh water is scarcest, and most desperately needed by the local population. Can't we just use seawater instead of fresh water? No, because that would corrode the machines in the data centers [9].

{ YOUR IMPACT }

AI tools are great. However, they also have downsides, and not all may be apparent to everyone. In this article, I've touched on several. Whether or not you think they are important, and whether

or not you will let them influence your choice about using these tools, is completely up to you. However, I think it's important to think about these issues, and perhaps formulate an answer for yourself, especially if you do decide to use these tools, and most especially if you want to use them to generate Sailor Moon fanfic in the style of Shakespeare.

Let's end this article the way we started it: with a quote.

"Science gathers knowledge faster than society gathers wisdom"
Isaac Asimov, 1988. ◄

{ REFERENCES }

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