GENERATIVE AI IN PRACTICE

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PRE ORDER NOW

It feels like generative AI has come out of nowhere, doesn't it? Perhaps you were happily going through life thinking artificial intelligence was something *other people* had to worry about. And then boom! Suddenly, everyone's talking about this new thing called ChatGPT and how it's going to take everyone's jobs.

As you've no doubt noticed, there's a lot of hype around generative AI (or GenAI as I call it in this book), and tools like ChatGPT. I expect you've picked up this book because you want to cut through the chatter and understand just what the deal is with GenAI. Is it really worthy of the hype? How might GenAI impact your job? Should your organization be leveraging this technology?

To answer the first question, yes, GenAI really is worthy of all the noise. I believe it's one of the most powerful, transformative technologies that humans have ever had access to. It's right up there with the emergence of the internet. Seriously. We'll cover the second and third questions throughout this book but, spoiler alert, GenAI (probably) won't take your job. That said, it will almost certainly change the way you work. And yes, your organization should absolutely be looking to harness this transformative technology. That's why I wrote this book.

THE INCREDIBLE IMPACT OF GENERATIVE AI

I'm not the only one convinced that GenAI is utterly transformative.

One study led by Harvard found that GenAI tools helped workers at the Boston Consulting Group gain a 40 percent performance boost.[i] We'll see many examples throughout the book of organizations using GenAI to accomplish work more easily, lighten the burden of mundane tasks, and provide a better employee (and customer) experience.

GenAI will be so ubiquitous that Bloomberg predicts the GenAI market will explode from £40 billion in 2022, to a whopping $1.3 trillion by 2032.[ii] What's more, according to research by McKinsey, GenAI could add up to $4.4 trillion in value to the global economy annually – and save up to 70 percent of workers' time.[iii] It's no wonder McKinsey refers to GenAI as "the next productivity frontier."

That's the economic impact, but what about our everyday lives and the way we do business? That, too, will be fundamentally altered by GenAI. We'll talk about the business and societal impact in Chapter 3, but to whet your appetite, GenAI will change how we work, how we shop, how we consume content, how we experience healthcare, how we learn (at school and otherwise), how we play video games, and even potentially how we date. Adam Selipsky, CEO of Amazon Web Services, says GenAI will "pretty much change every application inside of companies, every application that consumers interact with. It is a profound technological change that we're still at the very beginning of."[iv] I couldn't agree more.

But wait, back up a minute … $4.4 trillion in economic benefit? I know what you're thinking. *How the heck can chatbots add so much value?*

BECAUSE GENERATIVE AI IS MORE THAN CHATBOTS

We'll delve into a more detailed definition of GenAI in Chapter 1, but for now, all you need to know is that GenAI is a facet of artificial intelligence that allows computers to create content, including (but not limited to) text. One of the ways in which this technology can be harnessed is through more intuitive, more responsive chatbots – chatbots with advanced language capabilities that can respond to complex queries, and understand *context* as well as content.

ChatGPT is a chatbot. Developed by OpenAI and available free for public use (although a paid-for, upgraded version is available), it's probably the most advanced chatbot we've ever seen. It can answer almost any question you throw at it. It's brilliant. It's a great example of GenAI in action. However, GenAI is much bigger than ChatGPT. And its uses extend far beyond chatbots.

Therefore, this is not a book about ChatGPT (although ChatGPT will obviously feature in several examples throughout). This book shines a light on the vast array of tasks that GenAI tools can accomplish – from designing video games to interpreting medical scans, and more. Yes, GenAI gives computers the ability to converse and answer questions. But it can do so much more on top of that.

Almost every time I type "GenAI," I think of the word "genie." And for good reason. Working with GenAI is a bit like having your own personal genie to help lighten the load, get more done, and generally make life easier. (If only it could grant infinite wishes…)

That said, as we'll see in this book, getting the best out of GenAI requires a balance between human expertise and machine intelligence. This isn't about total automation – it's about

humans collaborating with GenAI to *do things better.* At the end of the day, GenAI is just a tool. An incredible tool. But a tool nonetheless – and it's up to us to use it thoughtfully.

With that in mind, my hope is that GenAI will be used not just as productivity tool, but as a force for good in our world. As an example, in Chapter 11, we'll see how GenAI can be used to democratize access to healthcare for people around the world. And in Chapter 14, we'll see how GenAI is speeding up the process of discovering life-saving new drugs. True, it can also be used to generate fake content to sway elections or be harnessed by criminals for all sorts of nefarious purposes. But GenAI also has the potential to help solve some of humanity's biggest challenges.

WHAT TO EXPECT FROM THIS BOOK

The bulk of this book focuses on practical applications of GenAI across a wide range of sectors. In other words, we'll explore how organizations are already using this technology – and, in the process, help you unearth potential use cases for your own organization. That's the focus of Part II of this book, practical examples and takeaways from other organizations that have deployed GenAI.

Then in Part III, we'll look at keys for success when implementing GenAI in your own business. Plus, you'll find predictions for the future of GenAI.

But before all that, Part I sets the scene for this powerful, transformative technology. We'll explore what the technology is, how it works, how it will change our world (and the world of business), and how it will impact jobs. We'll also take an honest look at the risks and challenges that surround GenAI.

Before you tuck into Part I, it's important to note that GenAI technology is rapidly evolving. And it's getting better and better all the time. Indeed, one of the things that made this book challenging to write is the fact that the technology is advancing so darn quickly. Amazing new use cases and updates to GenAI tools were emerging literally every week. As an example, I'd barely finished writing Part I when OpenAI launched a new version of ChatGPT that could not just answer written questions, but also understand speech and visuals, and respond in an artificial voice.

Safe to say, by the time you read this, new tools and new examples will have surfaced that continue to surprise and delight. It's truly an exciting time.

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[i] Enterprise workers gain 40 percent performance boost from GPT-4, Harvard study finds; Venture Beat; https://venturebeat.com/ai/enterprise-workers-gain-40-percent-performance-boost-from-gpt-4-harvard-study-finds/

[ii] Generative AI to Become a $1.3 Trillion Market by 2032, Research Finds; Bloomberg; https://www.bloomberg.com/company/press/generative-ai-to-become-a-1-3-trillion-market-by-2032-research-finds/

[iii] The economic potential of generative AI: The next productivity frontier; McKinsey; https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier

[iv] AWS CEO: Generative AI will 'pretty much change' every application consumers interact with; YouTube; https://www.youtube.com/watch?v=jQ18HJkLJjw

PART I

SETTING THE SCENE FOR AN AI REVOLUTION

I said in my introduction that Generative AI (GenAI) is one of the most powerful technologies humans have ever had access to. But what exactly is GenAI and how does it work? How did we get to this point? And how, broadly speaking, might GenAI change our world?

In this Part, we'll answer all those questions and more. We'll define GenAI and how it works, explore the evolution of GenAI until this point, outline the risks associated with GenAI, and take a big-picture look at how GenAI is going to change our world – including the jobs that humans do. This will set the scene nicely before we delve into GenAI use cases across various sectors and industries in Part II.

UNVEILING GENERATIVE AI: A NEW FRONTIER

Okay, let's go back to basics. What is generative AI? How does it work? And what is the technology capable of? You'll find out in this chapter as we delve under the hood of GenAI, tug at a few wires and examine what the heck's going on in there.

I really want this chapter to give you an inspiring feel for the many things that GenAI is capable of – but also, to drive home the point that GenAI isn't just about ChatGPT. Sure, ChatGPT is a prime example of GenAI (and it certainly hoovers up the majority of GenAI's press), but there's a lot more to GenAI than ChatGPT … as you'll find out in this chapter.

WHAT IS GENERATIVE AI? A QUICK EXPLANATION

Actually, let's start by defining artificial intelligence (AI) in its broadest sense. The term "AI" refers to computer algorithms that can effectively simulate human cognitive processes, like learning, decision making, and problem solving.

GenAI is a groundbreaking subset of AI – the cutting edge of the cutting edge – that is able to create new content based on patterns and structures it has learned from existing data. Like any AI, GenAI tools are given enormous amounts of data to learn from (what's known as "training data"). They learn from the training data, and then use the patterns or rules that they've learned to create new content that's similar to, but not exactly the same as, the data it has been trained on.

A good example is DALL-E 2 – the text-to-art platform that allows anyone to generate artworks. Or, of course, there's ChatGPT, the language model that can create text based on conversational text prompts. (You'll find a much bigger list of GenAI tools in the Appendix, by the way.) These systems learn from huge training datasets – ChatGPT, for example, was trained on vast amounts of text from the internet, including web pages, articles, and books.

Text and images are perhaps two of the best-known uses of GenAI so far, but the technology is capable of so much more. With GenAI you can generate product designs, computer code, music, video, voices, even entire visual worlds. We'll talk more about GenAI's capabilities later in the chapter, but to whet your appetite, imagine being able to create unique video game worlds rendered in real time, or have a book written *just for you*, or have your favorite celebrity read you today's news. The possibilities are mind-blowing.

The capabilities are already quite impressive, but in the future, GenAI systems will be able to create pretty much anything that humans can. And this, in turn, means GenAI can turn anyone and everyone into an author, musician, computer programmer, filmmaker or other type of creator.

How GenAI differs from the artificial intelligence we're used to

AI is increasingly part of the world around us, including the search results you get on your phone, your conversations with Alexa, and the movie recommendations that Netflix serves up on an evening. So what makes GenAI different to these "traditional" AI tools? (I realize it sounds strange to refer to "traditional AI" when it's hardly been around that long, but I do

so to distinguish between the AI that we're already used to in everyday life and this new evolution of AI systems. One technical term for traditional AI is "discriminative AI.")

Traditional AI systems also learn from large amounts of data, but they deliver a different output. Traditional AI systems are used to make *predictions* based on existing data. And we use those predictions to help us make better decisions, at work and in everyday life. This could span anything from listening to new music on Spotify, and viewing recommended products on Amazon, to identifying which of your company's customers are most likely to buy a certain product.

This new wave of GenAI tools goes even further, by *creating new content* based on existing data. In other words, GenAI isn't just about simulating human cognitive processes like decision making and problem solving – it's about simulating *human creativity*.

To further illustrate the difference, imagine you're playing computer chess. The computer knows all the rules, can predict your moves, and make its own moves. It's not inventing new chess moves; rather, it's selecting the right move based on existing strategies. That's traditional AI – it's like a master strategist who can make smart decisions within a set of rules. And it does it very well. But a GenAI? Well, that could, in theory, come up with new ways of playing chess that we haven't invented yet.

So, traditional AI excels at pattern recognition, while GenAI excels at *pattern creation*. Which is very cool indeed.

That said, GenAI and traditional AI aren't mutually exclusive. They could be used in tandem to provide even more powerful solutions. For example, a traditional AI could analyze user

behavior from your company's website, and then a GenAI could use the analysis to create personalized content for users.

HOW DOES GENERATIVE AI WORK?

Think of it like learning to draw by looking at many pictures. After looking at many pictures, you try to draw something new on your own. GenAI does something similar: it "looks" at a lot of data (text, visual or other), learns the patterns within that data, and then tries to create something new that fits those patterns.

So, in very simple terms, GenAI is like an artist or writer that has studied lots of existing works, and then tries to create its own work based on what it has learned. This process is powered by complex algorithms that mimic how our brain works in order to learn from data and identify patterns.

That's the super-simple explanation. Let's get a little more technical.

<u>Introducing machine learning and neural networks</u>

We'll talk more about the evolution of GenAI in Chapter 2, but as a quick primer, GenAI grew out of a field of AI study and practice called machine learning – indeed all of the AI we see today is based on machine learning. While traditional computer algorithms are coded by a human to tell a machine exactly how to do a particular job, machine learning algorithms are able to make decisions based on what they learn from the data. The more data they're fed, the better they get at this process.

Another term you'll need to get to grips with is "neural networks," as this is the core technology that GenAI is built upon. A neural network is essentially an advanced machine learning model inspired by the way human brains work. While a less complex machine learning model may need some human intervention in the process, a neural network has the ability to learn and make decisions by itself, and can even learn from its own errors – rather like the way a human learns through a process of trial and error.

Here's how a neural network works:

- Training: neural networks learn through a process called "training." During training, the neural network is fed a lot of data (which could be text, images, or whatever), and it learns to identify patterns and relationships in the data.
- Learning: as the neural network is exposed to more and more data – and we really are talking about vast amounts of data – it gradually gets better at identifying patterns and understanding the underlying rules that govern the data.
- Layers: neural networks are organized into layers, and each layer is responsible for identifying different types of patterns. The initial layers might identify simple patterns, and as we move deeper, the layers are able to identify more complex patterns.
- Generative models: GenAI often uses specific types of neural networks called "generative models." In addition to recognizing patterns, generative models are able to generate new data that is similar to (but not exactly the same as) the data they were trained on.

- Input and output**:** once the generative model is trained, you can give it an input (for example, a partial image or a text prompt), and it will generate an output (like a completed image or a piece of text) based on what it learned during training.

- Randomness: GenAI introduces a certain amount of randomness in the generation process, which means that it can produce slightly different outputs each time, even when given the same input over and over again.

Examples of generative models

I just mentioned generative models, the neural networks that enable GenAI to create new content. Here are some examples of generative models used in GenAI applications:

- Large language models (LLMs): by gobbling up large amounts of text, LLMs learn the semantic relationships between words and use that data to generate more language. An example of an LLM is GPT-4, created by OpenAI, which powers the ChatGPT tool.

- Generative adversarial networks (GANs): these work by pitting two competing algorithms against each other, one tasked with generating data that resembles its training data and another tasked with trying to tell whether the output is real or generated. This type of model is typically used to create images, sounds, or even video (including deepfakes).

- Variational autoencoders: this is a type of model that learns how data is constructed. It's often used to generate synthetic data.

- Diffusion models: these work by adding random data (known as "noise") to the data it's learning about, and then figuring out how to remove it while preserving the

original data. This way, the model learns what's important and what can be discarded. Diffusion models are most commonly used in image generation.

- Foundation models: this is something of an umbrella term for models that are pre-trained on a broad range of data at an enormous scale and then fine-tuned for specific tasks. These are large-scale, general-purpose models that are the foundation of LLMs and other GenAI tools.

With different models able to do different things, it's clear that GenAI has a wide range of applications. Which brings us to…

WHAT CAN GENERATIVE AI DO?

In Part II, we'll delve into how GenAI is already being used in practice (with lots of real-world examples), but for now, I really want to make the point that GenAI is capable of creating all sorts of content.

GenAI is so much bigger than ChatGPT

Of course, ChatGPT gets a lot of attention. For good reason; it's an impressive tool, and creating text is a major application of GenAI. Which is probably why "ChatGPT" and "generative AI" have almost become synonymous terms. But GenAI is capable of so much more than writing.

Take Coca-Cola's Masterpiece advert, for example. A collaboration between human artists and GenAI, the ad brings many of history's greatest artworks to life on the screen in a way that's never been done before. GenAI has also been used to create a new Beatles song by

rebuilding partially recorded lyrics by John Lennon, combined with new material by Paul McCartney.

But GenAI isn't just relevant to creative content. It's also being used to speed up drug discovery, with one UK company recently announcing that it's created the world's first AI-generated immunotherapy cancer treatment.

Then there's "generative design" – an emerging field where GenAI is used to create designs and production processes for new products. In one instance, General Motors used generative tools created by Autodesk to design a new seatbelt bracket that's 40 percent lighter and 20 percent stronger than its existing components.

And we can't talk about GenAI without talking about "deepfakes," which blur the lines between reality and fiction by making it appear as if real people have done or said fake things. GenAI is the technology behind deepfakes, and it's only going to get better at creating fake – but incredibly realistic – content. Deepfake Tom Cruise was one of the earliest and most famous examples (Google it if you haven't seen it – it's uncanny). More insidiously, potential candidates on both sides of the 2024 US presidential elections have starred in deepfakes designed to discredit them.

As if spreading false information wasn't bad enough, there are also outright criminal applications of GenAI, including attempts to extort money by staging hoax kidnappings using cloned voices, and, in one memorable example, fraudulently scamming money by posing as a company CEO.

As the technology has become more sophisticated, GenAI's capabilities have expanded greatly. To summarize, GenAI can be used to generate:

- Text

- Images

- Video

- Music and sound

- Designs

- Data analysis

- Computer code

- Synthetic data

- Research

- Video games and virtual worlds

Let's explore each usage in a little more detail.

Text – writing text that's (pretty much) indistinguishable from a human writer

Alongside ChatGPT, there are other generative text tools like Google's Bard and Meta's Llama. These tools can be used to write anything from essays and articles to plays, poems and novels.

Here are some of the incredible things that generative text tools can do for you:

- Writing assistants: helping you draft emails, reports, and other written materials efficiently.

- Creative writing: assisting authors in coming up with unique story ideas, characters, plotlines, or even drafting entire narratives.

- World-building: aiding authors in creating vivid and immersive worlds for their narratives, with tools that help outline histories, geographies, and cultures of fictional settings.

- Writing prompts: offering a variety of writing prompts to help writers overcome creative blocks and generate new ideas.

- Grammar and style corrections: offering real-time suggestions for improving the grammatical accuracy and stylistic fluency of written content.

- Translation assistance: help with translating texts to different languages while retaining the nuances of the original content.

- Accessibility: providing features like speech-to-text to help people with disabilities draft texts.

- Song writing: creating song lyrics, even in the style of your favorite artist.

- Recipe writing: coming up with recipes that suit your parameters (for example, "a dinner recipe that uses butternut squash, feeds a family of four, and takes no longer than 45 minutes.")

- Plain-English explanations and text summaries: helping you understand a complex topic in plain English, or providing a succinct summary of a long piece of text.

- Multiple-choice questions: generating quiz or test questions for a variety of topics, to beginner, intermediate or advanced level.

- Travel itineraries: aiding you with everything from finding flights and accommodations to suggesting popular attractions to visit. Even where to get a good meal, based on your dietary needs and budget.

<u>Images – creating images to your specifications</u>

Many GenAI tools – such as Midjourney or Stable Diffusion – can take a natural language prompt (i.e. regular, conversational language) and use it to generate a picture. Tell it you want an image of a two-headed dog wearing an Elvis costume flying a spaceship into a black hole and watch as it (or something close to it) appears before your eyes.

This can be useful for:

- Art creation: assisting artists in generating unique artworks by understanding and mimicking different art styles.
- Style transfer: enabling artists to apply the styles of famous artworks to their creations.
- Automated sketching: assisting in automatically generating sketches based on the descriptions provided, aiding artists in the initial stages of their work.

<u>Video – from editing to creation</u>

While not yet as advanced as text or image generation, tools are beginning to emerge that allow us to create and edit video simply by describing what we want to see.

Typical uses include:

- Enhanced editing: automating intricate editing tasks including cut detection, color correction, and subtitle generation, thereby streamlining the post-production process.

- Dynamic special effects: allowing real-time rendering of high-quality special effects, motion tracking, and 3D modelling, significantly reducing the time and effort involved in post-production.

- 3D modelling: facilitating the creation of 3D models and environments for integration into videos, helping to create immersive visual experiences.

- Sound design and synthetic voice: enhancing audio experiences through AI-generated music compositions and synthetic voices. Which brings us to…

Music and sound – from voices to songs

GenAI tools can create human-like voices (voice synthesis), allowing computers to speak words. They can also create music and sound effects.

In practice, this can be used for:

- Harmony suggestions: proposing harmonious chord progressions and melody lines.

- Generative music: creating entire musical pieces automatically based on a set of input parameters.

- Mood-based creation: offering tools that help composers create music tailored to specific moods or emotions.

- Voice synthesis: generating realistic voices that can read text naturally, providing a human-like auditory experience.

- Language and accent variability: offering a wide range of language and accent options, helping to create diverse and inclusive auditory experiences.

- Customizable voices: providing tools to create customizable voices, allowing users to personalize their auditory experiences.

Graphic design and generative design – streamlining design work

GenAI offers huge potential for graphic designers and product designers to streamline the design process – from automating aspects of visual design to creating multiple product design variations.

Some of the ways this may prove useful include:

- Design suggestions: aiding designers by providing design suggestions.

- Color palette suggestions: providing suggestions for color palettes that work well.

- Stock image integration: offering seamless integration with stock image libraries, giving designers easy access to a wide range of resources.

- Architectural design: assisting architects in generating building designs optimized for specific criteria like materials cost, energy efficiency, and spatial requirements.

- Product design: helping designers to come up with optimized and innovative product designs by exploring a vast number of design alternatives in a short time.

- Fashion design: assisting fashion designers by proposing new clothing designs based on current trends, historical data, and designer inputs.

Data analysis and reporting – democratizing data analysis

With GenAI tools, you don't need to be a data scientist to interrogate data. From generating automated reports to providing useful predictions, there are lots of ways GenAI can help businesses get the most out of data.

In terms of automated reporting, GenAI offers:

- Real-time reporting: offering tools that generate reports in real-time, providing up-to-date information for decision making.

- Visual representation: creating visual representations of data, such as graphs and charts, to make reports more understandable and engaging.

- Natural language summaries: generating summaries of reports in easy-to-understand language.

And in terms of predictive analysis, GenAI can deliver:

- Anomaly detection: identifying unusual patterns in data that may indicate potential issues or opportunities.

- Forecasting and customer insights: utilizing historical data to make accurate forecasts about future trends, and identify customer preferences.

- Simulation and modelling: creating detailed simulations based on data analysis, allowing organizations to explore potential scenarios and make better decisions.

Coding – computer programming made simpler

As well as ChatGPT, tools like Microsoft's GitHub Copilot and Amazon's CodeWhisperer make it easy for anyone to generate computer code with very little technical knowledge.

This can span:

- Code generation: creating code based on high-level descriptions or partially completed code.

- Code review: assisting in reviewing codes by identifying bugs, security vulnerabilities, and providing suggestions for optimization.

- Automated testing: creating tests automatically based on the software's specifications, helping to improve the software's reliability.

Synthetic data – solving privacy issues and more

GenAI makes it easy to create entirely synthetic data for use in training other AI models. And for everyday businesses, synthetic data can help them overcome the privacy and data security obligations that come with real-world data.

In practice, this may include:

- Data augmentation: creating additional data through techniques like image augmentation to enhance the training of AI models.
- Privacy preservation: generating synthetic data that preserves the privacy of individuals by not using real personal data.
- Balanced datasets: creating balanced datasets that help in reducing biases in AI models, promoting more fair and equitable AI systems.
- Diverse data: generating diverse datasets that help researchers explore a wide range of scenarios and conditions.

Research – making discovery easier and faster

There are many ways GenAI can aid the research process, with a few notable examples being:

- Drug discovery: speeding up the drug discovery process by predicting potential drug candidates through the analysis of vast datasets.

- Simulation environments: creating realistic simulation environments based on synthetic data, aiding researchers in conducting experiments and studies.

- Rare event modelling: assisting in modelling rare events through synthetic data, helping researchers explore scenarios that are difficult to study with real data.

<u>Video games and virtual world generation – making immersive content more responsive</u>

From virtual reality (VR) environments and immersive video game worlds to the wider concept of the metaverse, we're increasingly interacting with immersive, highly realistic content. Designing such content is a complex task that can be accelerated with the help of GenAI. Here's how:

- Procedural generation and design: creating intricate environments, realistic terrains, and adaptive storylines, fostering unique and immersive gameplay experiences.

- Character design and animation: generating natural character animations, and crafting consistent character personalities to enhance storytelling and immersion.

- Personalized user experiences: tailoring games and immersive environments to individual preferences and behaviors, fostering a more personalized and engaging user journey.

- Automated content moderation and security: monitoring and maintaining the safety of immersive environments, using automated systems to detect and manage inappropriate content.

THE IMPACT OF GENERATIVE AI

GenAI is clearly capable of amazing things and has the potential to transform business and everyday life. I'll explore examples from specific sectors across Part II, but for a broader overview, turn to Chapter 3.

The rapid evolution of GenAI is also forcing us to confront some difficult questions, and fast. For example, what happens when we reach a point where it's impossible to tell the difference between what's real content and what is generated by AI? There are no easy answers right now, but we'll do our best to delve into such thorny issues in Chapter 4.

And then there's the question of how all this will affect human jobs, as machines take on increasingly creative work. That's the subject of Chapter 5.

KEY TAKEAWAYS

In this chapter, we've learned:

- GenAI is a groundbreaking type of AI that is able to create new content based on patterns it has learned from existing data.
- While traditional AI simulates human cognitive processes like decision making, GenAI simulates *human creativity*.
- GenAI is made possible by neural networks – an advanced machine learning model inspired by the way human brains work.
- ChatGPT may have made GenAI famous, but GenAI is much bigger than ChatGPT. GenAI can be used to create music, sound and video, write computer code, design products, create immersive worlds, automate data analysis and reporting, and more.

Before we move on to the impact of GenAI and the issues surrounding it, let's briefly

explore the evolution of GenAI, from the early days of computing to now.

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