Cognishen Focus

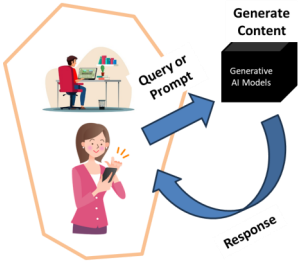
Generative Artificial Intelligence

Volume 3 Issue 2, February 2024

Our January newsletter explained Blockchain technologies, an innovative technology that can influence supply chain management. In this newsletter, we will look at Generative Artificial Intelligence (GAI) and how it is of interest to enterprises.

AI resurged as the topic of interest in 2023. The prominent news in the business scene was the news on generative AI. What is generative AI? How does generative AI impact work conditions? What are the trends in 2024 that will keep it on the front page? And how will these trends really affect businesses? Let us discuss those topics in the next few newsletters.

In the past year, we have heard and communicated about three tools in particular —ChatGPT, DALL-E, Bard, and GitHub Copilot — in chatrooms and at work, public, private, and other places. These three popular technologies are examples of generative AI. Generative AI are technologies that can learn and generate new content such as text, images, music, or video by analyzing trends in existing data.




### ChatGPT

Chat Generative Pre-trained Transformer, ChatGPT in short, is a generative AI model with which you can interact in a conversational way. The chat or dialogue format makes it possible to answer questions. The GPT model can challenge your queries or even reject your inappropriate requests. ChatGPT *learns* and *generates* new content such as text, image, music, or video by analyzing trends in existing data.

How do they learn and generate? Generative AI models are built on large language models (LLMs). LLMs use vast amounts of training data which are fed into complex algorithms in order to understand patterns and then create outputs based on statistical likelihoods. This is similar to your experiences in life. If you see dark clouds in the sky and with the trend that you have observed over the years of your life, you infer that it may rain. For instance, a popular algorithm used to learn and generate outputs from training data is generative adversarial networks (GANs). GANs use two competing networks to create outputs. A generator model creates outputs from training sets of data and a discriminator model classifies those outputs are either real or fake. The two models work in a zero-sum game, which through the back-and-forth generating and discriminating process, creates outputs that are indistinguishable from real data. GANs algorithms generate new data using the same statistics as the training data. If trained with a large number of photographs, say millions of photos, this technique is likely to generate new photographs using the characteristics found in the training albums of photographs. In a similar fashion, new music or textual data can be generated using a vast number of music or texts.

ChatGPT applies this concept to text-based conversation. For example, if you chat with the generative pre-trained transformer and ask to generate a wish for a forty, fifty, sixty, seventy, or an eighty-year-old, the wishes generated by the app differ based on different ages. ChatGPT , created by OpenAI, can make suggestions for you on any topic, describe diverse topics in detail, build your resume, and compose essays. You can have conversations with ChatGPT on any topic to make your daily life healthier and more productive.

## Technical Insight

### Natural Language Processing (NLP)

*Large language models (LLMs) use NLP to understand and generate text-based content.*

*What is NLP? NLP is a technology that enables computers the ability to interpret, manipulate, and comprehend human language. Organizations are exploding with a plethora of voice and text data from various communication channels like emails, text messages, social media newsfeeds, video, and audio.*

*Organizations can use NLP technology to automatically process those data, analyze the intent or sentiment in the message, and respond in real time to communicate with customers, suppliers, workforce, and other stakeholders. NLP can maneuver dialects, slang, and grammatical irregularities that are typical in current day-to-day conversations. Companies can use NLP predominantly to:*

- *Process, analyze, and archive documents,*
- *Streamline operations,*
- *Use chatbots for automated customer service,*
- *Communicate effectively with customers, and*
- *Analyze customer feedback and feelings.*

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"What was exciting to me, when I first interacted with ChatGPT, was how conversant it was. I felt like, for the first time, I could communicate with a computer, and it could interpret what I meant. We can now translate language into something that a machine can understand. I can't think of anything that's been more powerful since the desktop computer."
- Michael Carbin, Associate professor at MIT and founding advisor at MosaicML.

### Limitations of ChatGPT

ChatGPT is not a search engine. A search engine such as Google gives you current information, but ChatGPT can give you only old and sometimes not so accurate information depending on how you frame your query. For example, if you ask ChatGPT who won the college football in 2024, it will not know the answer, but Google would definitely let you know the correct answer.

The biggest limitation to ChatGPT is its lack of quality and unnecessary verbose in the generated responses. The problem is ChatGPT does not ask for further clarifications to your queries but makes guesses of your queries and hence the misguided information. Rather than searching and synthesizing answers, they use mathematical models to predict the most likely next word or output.

This brings us to writing code using ChatGPT! ChatGPT can produce both useful and unusable code. ChatGPT helps in assisting with specific coding tasks or routines, rather than building complete applications from scratch[1]. Maybe it can help you with simple plugins and clean up a simple code but otherwise please do not rely on ChatGPT to replace your programmers!

### Impact of Generative AI on Enterprises

There are both ***positive*** and ***negative*** impacts of generative AI on enterprises and their workforce. The impact of generative AI on enterprises will be revolutionary. McKinsey Global Institute estimates that generative AI will add between $2.6 and $4.4 trillion in annual value to the global economy, increasing the economic impact of AI as a whole by 15 to 40%[2]. A 2022 survey found that the ambitions of 600 senior data and technology executives around the globe were limited when it came to AI. While 94% of organizations were using AI in some way, only 14% were aiming to achieve "enterprise-wide" AI by 2025. A MIT report that through generative AI, organizations are finally adopting AI as a more general capability and an integrable entity in their organizational workflows[2]. CIOs and technical experts are adopting next-generation data infrastructures such as data Lakehouse to enable their companies for the next generation of corporate intelligence.

The MIT study forecasts that generative AI can automate half of consultant projects between 2040 and 2060. Goldman Sachs predicts a 7% increase in global GDP attributable to generative AI and predicts that two-thirds of U.S. occupations will be affected by AI-powered automation[3]. However, be warned that dystopian forecasts of AI automation to replace your workforce are overblown. In the MIT study, CIOs and academicians do not expect large-scale automation threats. Instead, they believe the broader workforce will focus on insight, strategy, and business value instead of time-consuming mundane work.

Enterprises must enable consistent governance and manage exponentially growing data sources. Lawmakers and regulators must be conscious of generative AI's risks, legal cases, usage restrictions, and new regulations. CIOs must be extra careful to adopt AI tools and understand the impacts of risks such as bias to copyright infringement to privacy and security breaches. The quality of information generated must be questioned constantly and good judgement exercised when using generative AI tools. Due to the risk of errors from training data that are biased or incomplete, employees may be led to inaccurate responses to inquiries. This will certainly further frustrate customers and potentially damage business reputation. In customer service applications, the use of ChatGPT AI may raise concerns on data privacy and security and customers may hesitate to share personal information. The use of ChatGPT AI in business operations raises several ethical and legal considerations as well and businesses must evaluate every generated response to ensure responsibility, legality, and ethics. In general, relying too heavily on ChatGPT AI for tasks can stifle creativity and innovation. Enterprises need to use generative AI detectors to try to mitigate generative AI risks!

**References:**

[1]Gewirtz, D. (2023). How to use ChatGPT to write code. ZDNet, Dec. 11, 2023. https://www.zdnet.com/ article/how-to-use-chatgpt-to-write-code/

[2]MIT (2023). The great acceleration: CIO perspectives on generative AI. MIT Technology Review Insights.

[3]Goldman Sachs (2023). Generative AI could raise global GDP by 7%. https://www.goldmansachs.com/ intelligence/pages/ generative-ai-could-raise-global-gdp-by-7-percent.html.

## Tech Briefs

### Data Lakehouse

*Data warehouses provide fast access to data to generate reports and insights for decision-making using an ETL (extract, transform, load) model. This approach limits the flexibility of data access if data is needed to be moved around for future use.*

*Data lakes store vast amounts of unstructured and structured data in its native format. Here, data is cleaned and processed to enable faster loading speeds for big data processing, machine learning, or predictive analytics. This approach requires expertise in data science, which limits the number of people who can use the data, and if not properly maintained, data quality can deteriorate over time.*

*A data Lakehouse combines the benefits of the large repositories of structured, unstructured, and semi-structured data of data lakes and the organized sets of structured data of data warehouses and enables enterprises to develop business intelligence applications.*

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