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How Gen AI and Analytical AI Differ — and When to Use Each

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Summary: Organizations that have recently discovered generative AI are at risk of overlooking an older and better-established form of AI, which the authors call “analytical AI.” This form of AI is by no means obsolete and is still an important resource for the great majority of companies. While a few applications of AI employ both analytical and generative AI, the two AI approaches are largely separate. To make decisions about the relative importance and value of generative AI and analytical AI, organizations must first understand the differences between the two technologies, and the different benefits and risks associated with each. They can then make decisions about which to prioritize under what circumstances based on their strategies, business models, risk tolerance, and other situations. Without an understanding of their differences, however, organizations risk under-utilizing one or both types to transform their businesses.

Since [OpenAI announced ChatGPT](#) in November of 2022, many business executives have focused their attention on generative AI. This relatively new technology set off a frenzy around AI and caused companies to pay attention to it for the first time. This is a positive development, since the technology is powerful and important, and enables many new business possibilities.

However, many companies have been using AI for years with less visibility. Those that have recently discovered generative AI are at risk of overlooking an older and better-established form of AI, which we’ll call “analytical AI.” This form of AI is by no means obsolete and is still an important resource for the great majority of companies. While a few applications of AI employ both analytical and generative AI, the two AI approaches are largely separate. Companies need to decide which type is the best fit for each specific use case.

To make decisions about the relative importance and value of generative AI and analytical AI, organizations must first understand the differences between the two technologies, and the different benefits and risks associated with each. They can then make decisions about which to prioritize under what circumstances based on their strategies, business models, risk tolerance, and other situations.

How Do Generative and Analytical AI Differ?

Different purposes and capabilities

Analytical AI and generative AI differ primarily in their purpose, capabilities, methods, and data. The primary purpose of generative AI is to use deep learning neural network models to generate new content — such as images, text, music, programming code, or even entire pieces of artwork — that mimic human creation. Analytical AI, on the other hand, refers to AI systems based on statistical machine learning that are designed for specific tasks, such as classification, prediction, or decision-making based on structured data. For example, in a marketing promotion to customers, analytical AI would be used to decide what product to promote to what customer, and generative AI would craft the personalized language and image used in the promotion.

Generative AI can produce content that is original and often indistinguishable from human-created content. Analytical AI is designed to perform specific prediction tasks efficiently, such as predicting

when a machine needs service, predicting the price a customer will pay, or recommending products based on user preferences — all based on predictive statistical models. GenAI can't do these things because it doesn't deal with these types of data.

Different algorithmic methods

In terms of algorithmic methods, generative AI often employs complex techniques such as transformers (which turn sequential inputs of text, for example, into coherent outputs), attention mechanisms (which predict the next word based on the context of the words preceding it), generative adversarial networks (GANs, which compete against each other to achieve a desired result, such as winning a game), and variational autoencoders (VAEs, which are models that generate, remove noise, and detect anomalies in new data derived from existing data) to generate content. These models learn to understand patterns in data to create new instances of it. Models are typically created by vendors (and [customized by user companies](#)) because they are large, require extensive computational resources, and require vast amounts of data.

Analytical AI utilizes a range of generally simpler machine learning approaches including supervised learning (using patterns in past data with known outcomes to predict unknown outcomes), unsupervised learning (identifying patterns in data without known outcomes), and reinforcement learning (rewarding a model for optimizing a specific goal), as well as various neural network architectures tailored to specific tasks. Models are typically trained on past data and applied “in inference” to predict new data (that is, applied to real-world situations) by companies themselves using their own data.

Different types of data

The two types of AI also differ in the types of data they use. Generative AI uses text, images, and other relatively unstructured data formats, all in a sequence that can be used to predict other sequences. Analytical AI employs structured data — typically rows and columns of numbers. The most common form of analytical AI, supervised learning, requires that the data being used to train the model has a known and labeled outcome. For example, a supervised model attempting to predict whether a patient will get diabetes (using predictive variables like weight, exercise levels, or relatives with diabetes) is trained on a dataset for which we know whether the patients did get the disease.

Different returns on investment

The two AI technologies also differ in the types of returns they can deliver to organizations. Broadly speaking, generative AI is more likely to yield cost savings from increased productivity in content generation, and analytical AI can yield better decisions, cost savings, and increased sales — although there are exceptions to this generalization.

Generative AI can provide returns from content generation by offering reduced costs compared to human content creation, as well as the potential for generating unique and engaging content that attracts and retains customers. It can be leveraged to create personalized content tailored to individual preferences. This can lead to higher customer engagement, increased conversion rates, and improved customer satisfaction, ultimately driving revenue growth. In industries such as fashion, automotive, or product design, generative AI can assist in generating design variations and prototypes quickly and efficiently. This can lead to faster innovation cycles, reduced time-to-market, and cost savings in product development. More broadly, generative AI tools can assist creative professionals by providing inspiration, generating ideas, or automating repetitive tasks. This can improve productivity, creativity, and overall quality of output, leading to better products and services.

In customer service, generative AI chatbots can be employed to answer customer questions or address issues as the front line of customer response. Cost savings in terms of replacement of call center workers by AI is often the objective. Chatbots based on generative AI usually offer better conversational ability than previous natural language chatbots.

Although there are many potential benefits of generative AI, its economic value can be difficult to measure — doing so would generally require controlled experiments among groups using and not using the technology, and detailed measurements of productivity. The performance of some groups (e.g., less experienced workers) may benefit more or less than others. Many of the above benefits also require training of generative AI models on a company's specific content, which can increase costs.

Analytical AI often provides better economic returns through predictive models that can help businesses forecast demand, optimize inventory management, identify market trends, and make data-driven decisions. This can lead to reduced costs, improved resource allocation, and increased revenue through better decision-making.

Analytical AI models can also analyze large volumes of customer data to uncover insights, preferences, and behaviors. Businesses can use this information to tailor marketing campaigns, create product recommendations, and deliver personalized customer experiences, leading to higher customer satisfaction and loyalty. Analytical AI can also be used to dynamically set prices for products and services, often improving profitability.

Analytical AI is also widely used in risk management and fraud detection: AI algorithms can analyze data in real-time to detect anomalies, identify potential risks, and prevent fraudulent activities. This can result in cost savings by minimizing losses due to fraud, improving security measures, and maintaining regulatory compliance.

The benefits of analytical AI are often easier to measure than generative AI because they are captured in transactional systems, what customers buy, and costs. Ultimately, both generative AI and analytical AI can provide significant ROI through increased efficiency, productivity, innovation, and customer satisfaction, albeit in different ways depending on the specific use case and industry.

Different risks

Security concerns around generative AI and analytical AI can differ based on their respective applications, capabilities, and potential risks. Generative AI, for example, enables convincing “deepfakes,” which can be used for misinformation, identity theft, and fraud. Since large language models are trained on existing data, generative AI can also potentially infringe upon intellectual property rights by generating content that resembles existing copyrighted material, potentially leading to legal disputes. Generative AI models may also involve privacy risks from sensitive information present in training data or company-specific data used to customize a model. Attackers may also manipulate input data to trick generative models into generating unintended outputs.

Analytical AI training data faces the same risks from cybersecurity breaches and hacks that other sensitive data does. In addition, AI models trained on biased or incomplete datasets can perpetuate existing biases or discriminate against certain groups. Analytical AI technology can be leveraged for malicious purposes, such as launching automated cyberattacks, spreading misinformation, or conducting social engineering scams. Security measures must be implemented to mitigate these risks and prevent AI-powered threats.

While both generative AI and analytical AI present risk and security concerns related to data privacy, bias, and adversarial attacks, the nature of these concerns may vary based on the specific characteristics and applications of each type of AI. At the moment, analytical AI seems to involve lower levels of risk, in part because it has been used in companies for several decades.

How Companies Can Strike the Right Balance Between Analytical and Generative AI

Companies will need to determine how to allocate management attention, investments, and talent to these two different domains of AI. A primary consideration is how familiar the relevant stakeholders are with the two types of AI. In general, generative AI is the door-opener. It gets non-technical executives and professionals excited about AI and offers few barriers to use. Analytical AI requires more of a statistical orientation to use effectively, so its primary audience is data scientists or quantitative people. That will probably always be a smaller user base than for generative AI, although generative AI interfaces can make it easier for nontechnical people to do simple forms of analytical models. Executives at companies with a large amount of structured data, however, such as financial services, retail, and telecom businesses, are likely to be familiar with analytical AI.

Several companies told us that a primary benefit of generative AI was making senior leaders more aware of AI in general. Sastry Durvasula, head of technology, data, and client services for TIAA, said, “ChatGPT has been a major catalyst for our shift to an AI-first strategy. It has elevated our AI initiatives to a foundational pillar of our enterprise strategy.” TIAA’s board and executive committee have embraced the AI-first approach, recognizing AI’s potential to enhance client services, improve operational efficiency, and drive innovation across the organization.

Bill Pappas, the Head of Global Technology and Operations at MetLife noted, “Encouraging collaboration and continuous learning across departments and functions plays a key role in eliminating silos and fostering new ideas and ways of thinking. Innovation is not just the IT department’s job. Rather, the strongest leaders know that innovation is dependent on an entire organization’s commitment to growth.”

The factors we describe below can provide a guide to the relative emphasis of analytical or generative AI within a company and industry.

Consider your strategy and business model

Does the company’s primary business involve creating, selling, or distributing content? If so, generative AI should be its major focus. But “content” includes a variety of domains. At Bristol Myers Squibb, chief digital and technology officer Greg Meyers commented, “Generative AI is particularly useful in document-heavy industries and for creating novel content, such as generating new proteins in computational biology.” This application helps accelerate clinical trials and improve efficiencies in drug development. The company uses analytical AI for tasks such as forecasting, demand planning, and predicting clinical site enrollment.

However, even businesses in content generation industries may find the probabilistic text prediction aspect of generative AI to be problematic. David Wakeling, global head of the AI Advisory Group at the large law firm A&O Shearman, told us in an interview that he doesn’t see generative AI as an existential threat given today’s technology. It can make lawyers more productive and efficient, he believes, but “the fundamental nature of generative AI is to make errors. You need an expert in the loop or you will get bad law,” he said.

Consider the format of proprietary and unique data assets

If the company's data assets are primarily unstructured content like text, images, or video, generative AI should take precedence. At Universal Music, for example, there is very strong interest in generative AI since it can create music, write lyrics, and imitate the voices of artists. Naras Eechambadi, the company's global head of data and analytics, said that the company and its clients are very interested in generative AI. He said he expects that the technology will gather steam slowly, and there'll eventually be some kind of tipping point. "We'll suddenly realize that this thing has had tremendous impact" on the industry and the company.

If, on the other hand, most of the company's data is structured and numerical, it should gravitate toward analytical AI. Katya Andresen, Chief Digital and Analytics Officer at Cigna, told us that delivering better health outcomes is the mission of the company. "Analytical AI," she commented, "allows us to predict patient needs, improve care management, and enhance operational efficiencies." This use of AI is integral to improving healthcare outcomes and reducing costs. Cigna is also exploring generative AI for creating content (including synthetic data for training) and personalized customer experiences.

There are other reasons for leaning one way or another in the primary AI focus at a company, including the experience of data science talent, the company's risk tolerance (generative AI is considered a riskier technology by most organizations), and the willingness to tolerate the higher benefit uncertainty with generative AI.

Ultimately, we feel that many AI use cases will combine the two approaches. AT&T, for example, which has employed approaches to democratizing AI for several years, is using generative AI to facilitate analytical AI. Its "Ask Data" application allows non-technical users to create statistical analyses and models — in other words, analytical AI — with straightforward English prompts using generative AI. Generative AI is acting as a front end conversational interface for analytical AI by writing code to do that type of statistical analysis. We expect that many more organizations will eventually create similar combinations.

Democratizing AI

While both types of AI are important to most organizations, it is generative AI that helps to democratize access to advanced tools. Durvasula of TIAA notes, "Generative AI will empower non-power users to leverage AI capabilities more effectively. We aim to help everyone in the enterprise become proficient with AI." The company's AI guild network exemplifies this approach, offering training and resources to employees across various functions.

Bristol Myers Squibb's Meyers acknowledges the potential of generative AI to make advanced technologies more accessible. "Generative AI is lowering the barrier for engaging with analytical AI. Anyone who can read and write can interact with generative AI, which expands the pool of people who can utilize these technologies," he notes.

CIGNA's Andresen agrees, adding, "Generative AI is democratizing access to complex tools and insights, enabling more employees to engage with data and AI technologies. This shift is crucial for fostering innovation and improving decision-making across the organization."

MetLife's Pappas indicated that MetLife conducted a survey which found that employees who think their employer provides the right amount of training and information about AI are more likely to be satisfied with their jobs and more likely to intend to stay in their jobs for the next 12 months. "As the landscape becomes more competitive for employers, it will be crucial for organizations to consider

how they're leveraging disruptive technology as a tool to retain and attract talent," he underscores. "Embracing emerging technology can yield more positive outcomes for employers."

The organizations we have described are evidence that it is important to understand both analytical and generative AI, and to apply each to their respective strengths within use cases. Together they can fuel new strategies and business models, create more data-driven cultures, yield higher levels of productivity, and facilitate better decisions. Without an understanding of their differences, however, organizations risk under-utilizing one or both types to transform their businesses.

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