Generative AI technology

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Why is in news? Generative artificial intelligence has become a buzzword this year, capturing the public's fancy and sparking a rush among Microsoft and Alphabet to launch products with the technology they believe will change the nature of work.

What is generative AI?

Like other forms of artificial intelligence, generative AI learns how to take actions from past data.

It creates brand new content , a text, an image, even computer codebased on that training, instead of simply categorizing or identifying data like other AI.

The most famous generative AI application is ChatGPT, a chatbot that Microsoft-backed OpenAI released late last year.

The AI powering it is known as a large language model because it takes in a text prompt and from that writes a human-like response.

GPT-4, a newer model that OpenAI announced this week, is "multimodal" because it can perceive not only text but images as well.

Generative AI's evolution

For an advanced technology that's considered relatively new, generative AI is deep-rooted in history and innovation.

1932
Georges Artsrouni invents a machine he reportedly called the **"mechanical brain"** to translate between languages on a mechanical computer encoded onto punch cards.

1957
Linguist **Noam Chomsky** publishes ***Syntactic Structures***, which describes grammatical rules for parsing and generating natural language sentences.

1966
MIT professor Joseph Weizenbaum creates the first chatbot, **Eliza**, which simulates conversations with a psychotherapist.

1968
Computer science professor Terry Winograd creates SHRDLU, the first multimodal AI that can manipulate and reason out a world of blocks according to instructions from a user.

1980
Michael Toy and Glenn Wichman develop the Unix-based game *Rogue*, which uses procedural content generation to dynamically generate new game levels.

1985
Computer scientist and philosopher Judea Pearl introduces Bayesian networks causal analysis, which provides statistical techniques for representing uncertainty that leads to methods for generating content in a specific style, tone or length.

1986
Michael Irwin Jordan lays the foundation for the modern use of recurrent neural networks (RNNs) with the publication of "Serial order: a parallel distributed processing approach."

1989
Yann LeCun, Yoshua Bengio and Patrick Haffner demonstrate how convolutional neural networks (CNNs) can be used to recognize images.

2000
University of Montreal researchers publish "A Neural Probabilistic Language Model," which suggests a method to model language using feed-forward neural networks.

2006
Data scientist Fei-Fei Li sets up the ImageNet database, which provides the foundation for visual object recognition.

2011
Apple releases **Siri**, a voice-powered personal assistant that can generate responses and take actions in response to voice requests.

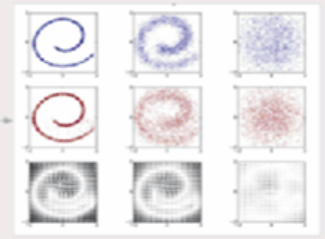
2012
Alex Krizhevsky designs the AlexNet CNN architecture, pioneering a new way of automatically training neural networks that take advantage of recent GPU advances.

2014
Research scientist **Ian Goodfellow** develops generative adversarial networks (GANs), which pit two neural networks against each other to generate increasingly realistic content.

Diederik Kingma and Max Welling introduce variational autoencoders to generate images, videos and text.

2013
Google researcher Tomas Mikolov and colleagues introduce word2vec to identify semantic relationships between words automatically.

2015
Stanford researchers publish work on diffusion models in the paper **"Deep Unsupervised Learning using Nonequilibrium Thermodynamics."** The technique provides a way to reverse-engineer the process of adding noise to a final image.



2017
Google researchers develop the concept of transformers in the seminal paper "Attention is all you need," inspiring subsequent research into tools that could automatically parse unlabeled text into large language models (LLMs).

2018
Google researchers implement transformers into BERT, which is trained on more than 3.3 billion words and can automatically learn the relationship between words in sentences, paragraphs and even books to predict the meaning of text. It has 110 million parameters.

Google DeepMind researchers develop AlphaFold for predicting protein structures, laying the foundation for generative AI applications in medical research, drug development and chemistry.

OpenAI releases GPT (Generative Pre-trained Transformer). Trained on about 40 gigabytes of data and consisting of 117 million parameters, GPT paves the way for subsequent LLMs in content generation, chatbots and language translation.

2021
OpenAI introduces **Dall-E**, which can generate images from text prompts. The name is a combination of WALL-E, the name of a fictional robot, and the artist Salvador Dali.

2022
Researchers from Runway Research, Stability AI and CompVis LMU release Stable Diffusion as open source code that can automatically generate image content from a text prompt.

OpenAI releases **ChatGPT** in November to provide a chat-based interface to its GPT 3.5 LLM. It attracts over 100 million users within two months, representing the fastest ever consumer adoption of a service.

2023
Getty Images and a group of artists separately sue several companies that implemented Stable Diffusion for copyright infringement.

Significance of Generative AI

Evolution of Generative AI

The technology is helpful for creating a first draft of marketing copy, for instance, though it may require cleanup because it isn’t perfect.

One example is from CarMax Inc, which has used a version of OpenAI’s technology to summarize thousands of customer reviews and help shoppers decide what used car to buy.

Generative AI likewise can take notes during a virtual meeting. It can draft and personalize emails, and it can create slide presentations.

Microsoft Corp and Alphabet Inc’s Google each demonstrated these features in product announcements this week.

Concerns with Generative AI

School systems have fretted about students turning in AI-drafted essays, undermining the hard work required for them to learn.

Cybersecurity researchers have also expressed concern that generative AI could allow bad actors, even governments, to produce far more disinformation than before.

At the same time, the technology itself is prone to making mistakes.

Factual inaccuracies touted confidently by AI, called “hallucinations,” and responses that seem erratic like professing love to a user are all reasons why companies have aimed to test the technology before making it widely available.