A Brief Overview of the Development of Generative AI

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Abstract: Since the 1950s, with the development of computers and information technology, especially the breakthroughs in deep learning technology, Generative AI has gradually evolved from a single language generation to a multimodal and embodied direction. And has shown a strong vitality through pretrain and prompt, with data-driven and powerful generative capability, deep learning and highly customised, intelligent simulation and real-time efficiency. It has the characteristics of data-driven and powerful generative ability, deep learning and highly customisable, intelligent simulation and real-time efficiency. A clear overview of the development of Generative AI will help promote agile governance and the development of technology for good while empowering various industries.

Keywords: Generative AI; Pretraining; Multimodal

In recent years, artificial intelligence technology has shown a booming trend, with Generative AI represented by large-scale models such as ChatGPT becoming the focus. These technological breakthroughs have not only surpassed perceptual intelligence, but are also rapidly advancing towards cognitive intelligence and general artificial intelligence, injecting powerful momentum into a new round of technological revolution and industrial transformation.In 2022, ChatGPT became extremely popular, drawing people's attention to the development of generative artificial intelligence. Simply put, generative artificial intelligence is an AI technology that can generate texts, images, and other content. Such AI has existed for a long time, but the emergence of Generative AI represented by ChatGPT is more due to the upgrading of its algorithm technology and data model, which has given Generative AI a brand-new look.

1.Connotation and characteristics of Generative AI

1.1.Connotations of Generative AI

Generative AI is a new paradigm for generating multimodal content such as text, images, sound and video through algorithmic techniques such as Generative Adversarial Networks , Variable Auto-Encoders and Autoregressive Models based on large scale pretrained modeling, in particular Transfomer modeling architectures. The core of the technology is "autoregressive" and the mo-dalities are "pretrain" and "prompt".

1.2. Characteristics of Generative AI

1.2.1.Data-driven with powerful generative capabilities

Generative AI is data-driven, capable of extracting information and knowledge from a database set and generating entirely new and creative content based on input conditions.The GPT-1 language model has 117 million training parameters, the GPT-2 has 1.5 billion, and the GPT-3 has 175 billion, and the growth of training data accompanying the language model iteration has reached nearly 13 times and nearly 117 times, respectively. The technological breakthrough of GPT-4 mainly focuses on the two aspects of multimodal task capability and long content generation, and the number of training parameters reaches the scale of hundreds of billions. From GPT-1 to GPT-4, the volume and quality of training data have been continuously improved, while the data mining capability has been continuously strengthened.

1.2.2.Deep learning and high customisability

Generative AI is based on deep learning models that can progressively extract low-level features from data and combine them into higher-level abstractions to minimise the discrepancy between the predicted output and the actual goal. Generative AI utilises an adaptive learning mechanism that not only performs well on known data, but also demonstrates good generalisation capabilities to generate reasonable and coherent content in unseen contexts. At the same time, it has strong contextual understanding and can adapt, configure, or retrain AI models to generate compliant content based on user-specific needs, preferences, or application scenarios.

1.2.3. Intelligent simulation and efficient empowerment power

Generative AI is "human brain intelligence" + "machine intelligence", which is able to simulate human thinking and creativity to generate brand new content, especially in the fields of vision and voice recognition. Through this powerful generative capability, Generative AI continues to empower all areas of society. Whether in finance, healthcare, education or entertainment, Generative AI is able to enhance industry efficiency and innovation by providing intelligent solutions. For example, in the financial sector, Generative AI can provide investors with more accurate investment advice by analysing large amounts of financial data.

2. The evolution of Generative AI

Artificial intelligence technology has been developing for more than seventy years, and has roughly experienced four waves, the first two waves were mainly breakthroughs in the neural network and language recognition technology level, and the third wave was supported by deep learning technology, and the node of Alpha Go's intellectual competition with human beings was the victory. Generative AI is beginning to take on brain-like characteristics, which is a typical representative of the 4th wave of AI.

2.1. First generation natural language processing, simple text analysis Generative AI

The 1950s and 1960s to the beginning of the 21st century were the early nascent stages of AIGC. The use of AI techniques to generate content was explored during this phase, but was limited to small-scale research experiments. With the rise of AI concepts, statistical models such as the N-gram model, which has the ability to be used to generate sequential data based on systematic learning, became an early form of generative modelling. As statistical methods evolved and machine learning became a focus of research, the concept of neural networks was revived. Scientists began to explore the use of neural network models to simulate human cognitive processes. At the same time, methods based on the principles of natural selection and biological evolution, such as genetic algorithms and evolutionary programming, were introduced to generate solutions that satisfy specific constraints or optimisation goals. Due to the limitations of computing power, Generative AI at this time had huge shortcomings and could only generate short sentences and simple sequences.

2.2. Deep learning technology breakthroughs, Generative AI for development in various fields

Deep learning is better able to deal with complex non-linear problems by building deep neural network perceptual models. Especially in areas such as image recognition and speech recognition.In 2007, the novel 1 The Road, written by an AI system assembled by New York University AI researcher Ross Goodwin, became the world's first novel created entirely by AI. At this stage, the application fields of Generative AI continued to expand, and were applied to speech synthesis, video generation, music composition and other fields, which enriched people's life and entertainment, and also provided new possibilities for art creation and media production and other fields. This is the stage of AIGC precipitation and accumulation, but due to the algorithm, the resulting content has more errors.

2.3. Compelling Chat GPT, the Great Explosive Rise Generative AI

In June 2018, OpenAI launched the GPT-1 model, which has some generalisation capabilities and is capable of natural language reasoning, Q&A and attempted reasoning, etc. CPT-2, GPT-3 and GPT-3.5, and GPT4 followed, with each generation of models achieving significant improvements in scale and performance.The launch of OpenAI's new GPT-4Turbo in November.2023 OpenAI launched the new GPT-4Turbo, the company's latest milestone in scaling deep learning, with Generative AI moving gradually from monolingual language generation to multimodal and embodied rapid The company's new GPT-4Turbo is the latest milestone in expanding deep learning. In the short term, Generative AI technology changes the basic productivity tools, it will change the production relations of society, and in the long term it will lead to a qualitative breakthrough in the productivity of the whole society.

Concluding remarks

The development of Generative AI is in a booming period. In this era of change, we need to meet the challenges and opportunities with an open mind and an innovative spirit, and jointly promote the development of "new quality productivity" and the corresponding production relations, as well as the progress and development of human society. At the same time, in order to cope with the prob-

lems and potential ethical risks at this stage, we need to strengthen the construction of policies and regulations, interdisciplinary cooperation and communication, as well as the enhancement of the public's digital literacy, so as to minimise the ethical risks of Generative AI and better empower the society at the same time.

References

[1] Xiaoli Wang,Chi Yan. Risk issues and regulatory progression of Generative AI macromodels: an example of GPT-4[J/OL]. Journal of Beijing University of Aeronautics and Astronautics (Social Science Edition),1-11[2024-06-20].

[2] Wen Zhao. Research on Generative AI Generated Content Governance - A Perspective on ChatGPT[J]. Communication and Information Technology,2024,(02):95-99.

[3] RYAN T. Chips and Science Act [R/OL]. (2022-08-09)[2023-04-05].

[4] David Rozado, "The Political Biases of Chat GPT," Social Sciences, Vol. 12, No. 3, 2023, pp. 1-8.

[5] HU Bing,JONG Siyue. Implications of the Dutch preemptive techno-ethical thinking for AIGC governance[J]. Young Journalist,2024(02):48-54.

[6] Zhang Haopeng,Xia Baohua. What makes artificial moral intelligences feasible - based on an examination of value-sensitive design[J]. Natural dialectics research,2021,37(04):37-42.

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