Exploration of Generative Artificial Intelligence

Subjects: Computer Science, Artificial Intelligence

Contributor: Subhra Mondal , Subhankar Das , Vasiliki G. Vrana

Generative Artificial Intelligence (GAI) has brought revolutionary changes to the world, enabling businesses to create new experiences by combining virtual and physical worlds. As the use of GAI grows along with the Metaverse, it is explored by academics, researchers, and industry communities for its endless possibilities.

GAI ChatGPT Bard AI OpenAI

1. Introduction

Over the past few decades, there has been a growing emphasis on technological innovation within organizations leading to increased attention in research [1][2]. Organizations have recognized the potential of technological innovations to enhance their competitive advantage. Numerous studies have demonstrated that firms can leverage technology to improve their performance and drive innovation [3][4]. Furthermore, the increasing prevalence of AI in today's market has been shown to have a significant impact on firms' innovation strategies, as evidenced by several studies [5]. Economists and industry experts have been attempting to comprehend the effect of Generative Artificial Intelligence (GAI) on innovation and have urged for further investigation on the subject [6][7]. Scholars, who are focused on utilizing technology in creation, have also started to investigate this issue [8][9][10]. Studies on the use of GAI by customers in various sectors have primarily focused on identifying the barriers that prevent them from achieving the maximum outcome and how AI can assist them in making decisions and enhancing their operations [11][12].

Conceived as a sub-discipline within AI, GAI allows users to create new content, such as text, images, audio, and videos. It has attracted the interest of various tech companies, such as Google, Microsoft, Baidu, and Apple. OpenAI's Codex, DALL-E, and ChatGPT are some of the tools used for this process [13]. Every year, a single overarching idea tends to define the major tech trend. For instance, in 2022, XAI and Web3 emerged as buzzwords that caught the tech world's attention. Although these trends show no signs of slowing down, 2023 is expected to be dominated by GAI. The concept of GAI involves using algorithms to generate new content. ChatGPT, a chatbot capable of producing articles, poems, and computer programs, is a prominent example of this technology. Its ability to generate high-quality content is both impressive and a little scary [14]. ChatGPT, developed by OpenAI—a research organization backed by Microsoft—has garnered significant attention since its unveiling in November 2022. Its debut has led some to believe that AI is becoming more mainstream. With the commercial success of ChatGPT, Google recently launched an experimental service called Bard, which demonstrates how AI could potentially revolutionize search by providing more nuanced responses to users. [15]. The same week, Microsoft also unveiled a new Bing-powered version by ChatGPT, designed to provide users with more accurate and timely

search results. Instead of relying on the traditional ladder approach to search results, ChatGPT takes a request, scans for answers, and provides a response that includes citations to the sources.

Despite the increasing importance of the role of GAI in innovation studies, there has been little effort to establish a comprehensive theoretical framework for analyzing its applications in various sectors. Moreover, the lack of a clear framework for assessing the impact of GAI on the innovation management process has hindered the development of effective strategies [16][17]. To tackle these issues, a comprehensive theoretical review of the literature on GAI was conducted.

2. Exploration of GAI

GAI is used to create new content such as videos, audio, and text. Recent breakthroughs in this field have the potential to significantly change how we create content. One example of a chatbot that uses GAI is ChatGPT, which can answer questions on the spot. The OpenAI chatbot (ChatGPT), released to the public in November 2022, is regarded as the best. It already had over a million users in just five days [18]. Its creators also posted impressive examples of its output, such as poems and computer code. While the impact of GAI on content creation is still uncertain, some experts in fields such as advertising and education are keeping a close eye on developments in this area.

While there are concerns about the impact of GAI and machine learning on various industries, there is also significant potential for these technologies to have a positive impact. In recent years, machine learning has demonstrated potential in a variety of fields, including medical imaging. Aside from the technology, multiple questions must be answered to develop GAI models [19]. For instance, how does it fit into the broader machine learning framework?

Although ChatGPT has received a lot of attention recently, it is not the first text-based AI model to generate interest. Google's BERT and OpenAI's GPT-3 have been released to some fanfare in the past couple of years. Despite their impressive capabilities, AI chatbots were not always well reviewed [20]. Google's chatbots have been criticized in some cases for their limited abilities and inability to provide satisfactory responses to user queries. However, recent advancements in GAI have shown promise, and chatbots such as ChatGPT demonstrate the potential for these technologies to continue to evolve and improve. It will be important to continue to explore new ways to apply AI chatbots in a way that maximizes their benefits and minimizes their limitations.

In the past, human-trained models could classify text according to labels suggested by researchers. This type of training is referred to as supervised learning and involves a human overseeing and instructing the model. Text-based models, on the other hand, are currently being trained using a self-supervised learning approach. This method feeds a model a large amount of text, which helps it generate predictions. For instance, models can predict how a sentence will conclude. These models can become very accurate with the correct sample text, such as a broad swath of online text.

In 2023, GAI was showcased in an epochal manner. AI disrupted the world in 2022 as multiple startups such as DALL-E, MidJourney, and StableDiffusion appeared. Then, in just five days, ChatGPT became one of the most used platforms on the internet, with over a million users. In response to ChatGPT, Google on 7 February 2023 introduced Bard [21]. Google's newly launched web app, Bard, is expected to be integrated with the company's other products, including Google Maps and Gmail. The emergence of large language models such as Bard and ChatGPT highlights the evolution of AI from being innocuous to invasive. However, they also pave the way for more productive and creative applications of AI.

The field of AI has been a hot topic for decades. In recent years, the concept of GAI has gained widespread attention. This technology allows systems to create new content without specific training, such as music, images, and text. Large language models known as generative pre-trained transformers (GPT) are used in this type of project. "Generative" refers to a system that can create a new text based on the input it receives, while "pre-trained" is a system trained on a large amount of text data. "Transformers" can produce output text using a transformer-based framework. Despite the layoffs of tech workers, the interest in GAI remains high. In 2022, about USD 49 billion was invested in AI, 40% higher than the previous year. Despite the tech downturn, AI companies are still attracting much attention from investors. Developing a GAI model is a complex task that only a handful of prominent tech companies have attempted [22]. OpenAI is a leading company that has developed several cutting-edge AI models, including DALL-E, ChatGPT, and GPT. Google's parent company also owns DeepMind, which is known for its deep learning software. Meanwhile, Meta has entered the field of GAI with its recent product release.

References

1. Mustak, M.; Salminen, J.; Plé, L.; Wirtz, J. Artificial intelligence in marketing: Topic modeling, scientometric analysis, and research agenda. J. Bus. Res. 2021, 124, 389–404.
2. Kakatkar, C.; Bilgram, V.; Füller, J. Innovation analytics: Leveraging artificial intelligence in the innovation process. Bus. Horiz 2020, 63, 171–181.
3. Mariani, M.M.; Nambisan, S. Innovation Analytics and Digital Innovation Experimentation: The Rise of Research-driven Online Review Platforms. Technol. Forecast. Soc. Change 2021, 172, 121009.
4. Mariani, M.M.; Perez-Vega, R.; Wirtz, J. AI in marketing, consumer research and psychology: A systematic literature review and research agenda. Psychol. Mark. 2021, 39, 755–776.
5. Mariani, M.M.; Wamba, S.F. Exploring how consumer goods companies innovate in the digital age: The role of big data analytics companies. J. Bus. Res. 2020, 121, 338–352.
6. Desouza, K.C.; Dawson, G.S.; Chenok, D.J. Designing, developing, and deploying artificial intelligence systems: Lessons from and for the public sector. Bus. Horiz. 2020, 63, 205–213.

7. Haefner, N.; Wincent, J.; Parida, V.; Gassmann, O. Artificial intelligence and innovation management: A review, framework, and research agenda. Technol. Forecast. Soc. Change 2021, 162, 120392.
8. Verganti, R.; Vendraminelli, L.; Iansiti, M. Innovation and Design in the Age of Artificial Intelligence. J. Prod. Innov. Manag. 2020, 37, 212–227.
9. Belhadi, A.; Mani, V.; Kamble, S.S.; Khan, S.A.R.; Verma, S. Artificial intelligence-driven innovation for enhancing supply chain resilience and performance under the effect of supply chain dynamism: An empirical investigation. Ann. Oper. Res. 2021, 1–26.
10. Di Vaio, A.; Palladino, R.; Hassan, R.; Escobar, O. Artificial intelligence and business models in the sustainable development goals perspective: A systematic literature review. J. Bus. Res. 2020, 121, 283–314.
11. Hutchinson, P. Reinventing Innovation Management: The Impact of Self-Innovating Artificial Intelligence. IEEE Trans. Eng. Manag. 2021, 68, 628–639.
12. Huang, M.; Rust, R.T. A strategic framework for artificial intelligence in marketing. J. Acad. Mark. Sci. 2021, 49, 30–50.
13. Heeter, M.; Clark, K.; Woo, E. Benchmark Expected to Join Generative AI Rush With Deal for Startup LangChain. The Information. 15 February 2023. Available online: https://www.theinformation.com/articles/benchmark-expected-to-join-generative-ai-rush-with-deal-for-startup-langchain (accessed on 20 February 2023).
14. Jose, B. What Is Generative AI and Why Is It Keeping Google, Microsoft & Meta on Their Toes? The Indian Express. 16 February 2023. Available online: https://indianexpress.com/article/technology/artificial-intelligence/what-is-generative-ai-8445156/ (accessed on 20 February 2023).
15. Sawers, P. TechCrunch Is Part of the Yahoo Family of Brands. 13 February 2023. Available online: https://techcrunch.com/2023/02/13/as-chatgpt-hype-hits-fever-pitch-neeva-brings-its-generative-ai-search-engine-to-international-markets/?guccounter=1 (accessed on 20 February 2023).
16. Donthu, N.; Kumar, S.; Mukherjee, D.; Pandey, N.; Lim, W.M. How to conduct a bibliometric analysis: An overview and guidelines. J. Bus. Res. 2021, 133, 285–296.
17. Dwivedi, Y.K.; Hughes, L.; Ismagilova, E.; Aarts, G.; Coombs, C.; Crick, T.; Duan, Y.; Dwivedi, R.; Edwards, J.E.; Eirug, A.; et al. Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. Int. J. Inf. Manage 2021, 57, 101994.
18. Dash, J. ChatGPT & Bard AI: How Generative AI Is Storming Our Lives. 12 February 2023. Available online: https://indiaai.gov.in/article/chatgpt-bard-how-generative-ai-is-storming-our-lives

(accessed on 20 February 2023).

19. Chui, M.; Hall, B.; Mayhew, H.; Singla, A. The State of AI in 2022—And a Half Decade in Review. McKinsey & Company. 6 December 2022. Available online: https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai-in-2022-and-a-half-decade-in-review (accessed on 5 February 2023).
20. Chui, M.; Kamalnath, V.; McCarthy, B. An Executive's Guide to AI. McKinsey & Company. 2023. Available online: https://www.mckinsey.com/capabilities/quantumblack/our-insights/an-executives-guide-to-ai (accessed on 5 February 2023).
21. Chui, M.; Manyika, J.; Miremadi, M. What AI Can and Can't Do (Yet) for Your Business. McKinsey & Company. 28 April 2022. Available online: https://www.mckinsey.com/capabilities/quantumblack/our-insights/what-ai-can-and-cant-do-yet-for-your-business (accessed on 20 February 2023).
22. What Is Generative AI? McKinsey & Company. 19 January 2023. Available online: https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-generative-ai (accessed on 20 February 2023).