Recommendation

Towards a Society that Embraces and Utilizes Generative AI

27 February 2025

Science Council of Japan

This Recommendation is largely the outcome of the deliberations by the Committee on Informatics, Science Council of Japan, and is issued under the auspices of the Science Council of Japan.

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This English version is a translation of the original written in Japanese.

Executive Summary

1 Background of the Proposal

Generative AI, which has been advancing at an unprecedented pace, exhibits several key characteristics: comprehensiveness, as it exerts a profound impact on all academic disciplines, industrial sectors, and society as a whole; innovativeness, as it possesses the potential to attain an intellectual level capable of coexisting with humans in the future; and acceleration, as it develops exponentially. Given these characteristics, generative AI presents not only threats and challenges but also significant ripple effects across society. Moreover, it holds the potential to provide solutions to critical issues that human society faces.

Under these circumstances, this proposal aims to provide an in-depth academic analysis of the current state and trends of generative AI, its associated risks and challenges, and the ripple effects of its utilization. Furthermore, this proposal outlines policy recommendations for realizing a society that effectively embraces and utilizes generative AI.

2 Current Status and Challenges

Since the 2020s, generative AI technology has advanced and proliferated at an extraordinary pace. Notably, ChatGPT, built upon Large Language Models (LLMs), reached 100 million active users within just two months of its release in November 2022. LLMs are underpinned by a neural network architecture known as the Transformer, and it is well established that their performance improves logarithmically with increases in model size (i.e., parameter count) and training data volume. Beyond text, generative AI has been increasingly applied to multimodal processing that integrates images, videos, speech, and music, as well as to robotics.

Generative AI presents a variety of risks, including hallucinations (i.e., the generation of factually incorrect or misleading content), fraud and disinformation campaigns facilitated by high-quality synthetic media, the generation of socially inappropriate responses, and the leakage of sensitive information. Furthermore, copyright infringement, defamation, threats to artistic activities, and potential disruptions to societal values and cultural norms have also been identified as critical issues. To address these issues, generative AI models must demonstrate accuracy, adherence to instructions, robustness, transparency, and explainability.

Conversely, generative AI holds significant promise for benefiting human society. In science and technology, AI-driven advancements are poised to accelerate hypothesis generation, hypothesis validation, and the dissemination of scientific knowledge through academic publications. While concerns grow over the fragmentation of academic disciplines due to increasing segmentation and specialization of knowledge, generative AI has the potential to facilitate interdisciplinary knowledge creation. In the industrial sector, generative AI-driven workflow optimization and workload reduction offer viable solutions to pressing societal challenges such as labor shortages and excessive working hours. Additionally, its applications have already begun to expand into our daily activities, such as enhancing the efficiency and quality of education, as well as assisting with the elaboration, summarization, and translation of texts, supporting the creation of greetings and emails, proposing travel plans and investment advice, and creating music, art, and design.

3 Policy Recommendations

As the global advancement of generative AI shows no signs of slowing down, Japan must proactively promote research and development (R&D) and the societal implementation of generative AI, while simultaneously taking robust risk mitigation measures. Japan should also take a leading role in designing a harmonized society where humans and AI can coexist.

(1) Optimal Framework for Generative AI Research and Development

① To enhance Japan's technological competitiveness, the Government must position the promotion of generative AI R&D as a national strategic priority. In particular, support for open R&D initiatives should be valued and strengthened.

② Japan should foster a robust domestic research community for generative AI while promoting international research collaboration. To achieve this, alongside the development of data infrastructure with consideration for privacy and security, the public release of datasets and industry-academia data sharing initiatives must be encouraged.

③ It is crucial that decisions and actions taken by generative AI align with human values and ethical principles. Thus, transparency in training data, learning methodologies, and development processes must be ensured, along with the establishment of guidelines to minimize risks in the design, development, and evaluation of AI systems. Lastly, Japan must actively establish a framework to reflect its policy perspectives on the global rule-making process for AI governance.

(2) Appropriate Operation of Generative AI Models

① Generative AI models must be adequately protected from cyber and physical attacks. A robust system capable of detecting and preventing such threats should be established.

② A rapid and effective response framework must be put in place to address issues arising from AI technologies. For this, through international cooperation it is essential to promote the development and deployment of AI from global perspectives by standardization of AI technologies and the sharing of best practices.

③ Toward the realization of a sustainable, human-centered society, rather than relying solely on market principles and the principle of competition, the deployment and operation of AI should prioritize addressing global challenges and critical socio-economic issues.

(3) Institutional Design for the Responsible Implementation of Generative AI

① Traditional regulatory models are insufficient to address the complex and rapidly evolving risks posed by AI. Instead, an agile, iterative, and multi-stakeholder governance framework should be pursued.

② The Government should take the lead in fostering open rule-making processes, designing mechanisms that encourage active cooperation in incident investigations, and establishing swift redress systems for victims of AI-related incidents.

③ Private-sector entities should ensure the disclosure of information with adequate quality and quantity to relevant stakeholders, including government authorities. They should also keep enhancing AI governance frameworks and ensure responsible deployment by incorporating feedback from stakeholders.

(4) Education and Literacy in the Era of Generative AI

① The entire society must actively engage in education and reskilling efforts related to generative AI. To facilitate this, it is essential to develop AI-literate professionals, promote educational programs, and provide widespread reskilling support. Special attention should be given to regional disparities, not only to mitigate them but also to leverage AI education as a means of bridging existing gaps.

② After thorough deliberation, on the premise of utilizing AI, education systems should undergo a paradigm shift to accommodate AI, aiming at harmonized human-AI coexistence. Instead of focusing excessively on traditional knowledge transmission, curricula should be designed to foster critical engagement with AI, enhance problem-solving skills, and

cultivate creativity. Additionally, the Government should support platforms for information exchange and discussions on the development of new educational frameworks.

③ The utilization of AI has the potential to deepen interdisciplinary academic inquiry and contribute to solving complex societal challenges. To achieve this, scientists must acquire advanced AI literacy, and mechanisms should be established to facilitate dialogue and collaboration across academic disciplines and between academia and industry.