Empowerment and Disempowerment: AIGC' s Technological Dividend and Risk Regulation Postprint

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Abstract

Purpose: The explosive popularity of ChatGPT has propelled AIGC applications from niche to segmented and mass markets. While releasing technological dividends, it has also given rise to numerous risk issues. Expanding technological applications while simultaneously refining risk regulation can facilitate the high-quality, sustainable development of the industry. Method: This article systematically examines the opportunities and challenges presented by AIGC across dimensions including content supply, information source adoption, model fine-tuning, and industry application. Results: It indicates that AIGC is currently generally available and usable, partially moldable and trustworthy, and in the future, replaceable and promising. Conclusion: While "negative impacts" certainly exist, "empowerment" holds greater promise. Within an inclusive and prudent framework, it is essential to establish boundary constraints for technological development, and even more importantly, to provide flexible space for technological application.

Full Text

Preamble

Empowerment and Disempowerment: AIGC' s Technical Dividends and Risk Regulation

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Abstract

[**Purpose**] The explosive popularity of ChatGPT has propelled AIGC applications from niche to segmented and mass markets. While releasing technological

dividends, this has also spawned numerous risk issues. Expanding technological applications while simultaneously improving risk regulation will contribute to the high-quality, sustainable development of the industry. [**Method**] This article systematically examines the opportunities and challenges brought by AIGC from the dimensions of content supply, information source adoption, model optimization, and industry application. [**Result**] It points out that AIGC is currently basically available and usable, partially malleable and trustworthy, and in the future may become replaceable and promising. [**Conclusion**] While "disempowerment" certainly exists, "empowerment" is even more promising. Within a framework of inclusive and prudent regulation, we must provide both boundary constraints for technological development and flexible space for technological application.

Keywords: AIGC; technical dividends; risk regulation; technology ethics; ChatGPT
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1. Industrial Background: AIGC Unleashes Massive Growth Potential

Artificial Intelligence Generated Content (AIGC), also known as Generative AI, refers to the process of using AI to automatically create information content while meeting users' personalized needs [1]. As a new engine for content creation in the Web3.0 era, AIGC has surpassed the Professional Generated Content (PGC) model of Web1.0 and is expected to soon exceed the User Generated Content (UGC) model of Web2.0, whether in terms of content integration efficiency and production effectiveness, or in information organization structure and interaction patterns. *Science* has listed AIGC as one of the "Top Ten Scientific Breakthroughs of 2022," projecting that by 2025, AIGC will account for 10% of all generated data, generating trillions of dollars in economic value [2]. From both industrial scale and economic increment perspectives, AIGC has unleashed enormous growth potential.

However, the rapid breakthroughs in artificial intelligence have also triggered a series of confusions about technological development, with underlying social risks, ethical risks, and challenges to human subjectivity sparking considerable controversy. This necessitates more sober thinking and more comprehensive research on AIGC development. Currently, both academia and industry hold mixed views on AIGC. While its powerful production and adaptation capabilities have largely liberated human productivity, issues such as content distortion, violations, infringement, information redundancy, political bias, and technolog-

ical ethics in its application process have also been widely criticized. Strengthening risk regulation and quality assurance mechanisms while fully activating AIGC' s technological dividends is crucial for implementing China' s "New Generation Artificial Intelligence Development Plan," "New Generation Artificial Intelligence Ethics Norms," and "Internet Information Service Deep Synthesis Management Regulations," and for achieving the long-term, stable, and healthy development of the digital content industry.

2. Technical Dividends: From Available to Usable

From both technological R&D and industry application perspectives, AIGC has largely liberated productivity, restructured production relations, and released technological dividends. An increasing number of industries are exploring automated content production, gradually giving rise to new business models adapted to this technology. In terms of content modalities, current AIGC encompasses text, voice, code, images, video, and other multimodal forms, with widespread applications in news, music, film and television production, and other industries, greatly enriching information content in virtual digital spaces [3]. From a production perspective, AIGC has overturned traditional content output models. Based on artificial intelligence technologies such as Generative Adversarial Networks (GAN) and large pre-trained models, it generates relevant content through appropriate generalization capabilities [4]. From an application value perspective, AIGC' s high-throughput, low-threshold, and high-degree-of-freedom generation capabilities are broadly adapted to various application scenarios. Venture capital in the AIGC sector increased fourfold between 2020-2022, and the number of deep synthesis videos released in 2021 was ten times that of 2017. On the basis of enhancing media affordance, improving the usability of generated content is necessary to mine AIGC' s technological dividends.

2.1 Media Affordance

Media affordance refers to the possibilities for users to act with a medium in a specific context, based on the medium' s characteristics, capabilities, and limitations, and according to their own needs or purposes [5]. From the user perspective, affordance involves users' own media literacy and interaction capabilities; from the product perspective, affordance is more related to information supply capacity and service convenience. For AIGC applications, the usage threshold is gradually being lowered, allowing both professional and ordinary users to interact with relative ease. However, different AIGC products exhibit differentiation in information categories, media modalities, supported languages, and carrying capacity, which also limits the scale, speed, and type of information content output, thereby impacting media affordance.

In terms of information category affordance, mainstream AIGC products can generally be divided into general-purpose and professional types. General-purpose AIGC can organize information, create content, and output for broad knowledge domains, while professional AIGC products focus on information

integration and content output in specific domains, such as intelligent Q&A systems in vertical fields like healthcare, finance, and automotive, as well as machine news products in finance, sports, and meteorology. From an application scenario perspective, general-domain AIGC typically targets mass C-end users, covering broader information topics and more diverse interaction patterns. However, limited by the openness and multi-source nature of training datasets, their content quality is relatively constrained. Professional-domain AIGC generally serves B-end, G-end, and some professional C-end users, focusing on model training and optimization for specific fields, with stricter control over training corpora that emphasizes information depth over breadth. While general-domain AIGC including ChatGPT has gradually become a mass-level application, its business model remains to be further expanded. Vertical-domain AIGC offers greater commercial potential but requires further optimization in corpus annotation and model training, with its applicable domains also needing expansion.

Regarding media modality affordance, AIGC is currently widely applied in text generation, image generation, audio generation, video generation, and other fields (as shown in Table 1), with cross-modal generation among text, images, audio, and video gradually maturing. Text generation includes interactive text (typically in dialogue Q&A format) and non-interactive text (intelligent writing based on specific instructions), which further divides into structured writing (such as current mainstream machine news products) and creative writing (such as copywriting, poetry, and literary works). Compared with programmatic, templated structured writing, creative writing offers higher openness, freedom, and personalization, but still faces many technical challenges to be overcome. Similarly, image generation can be divided into intelligent image editing (structured) and autonomous image generation (creative). The former involves auxiliary modification, synthesis, and automatic adjustment of existing images, while the latter automatically creates entirely new paintings according to specific instructions and style requirements, including 2D and 3D multimodal images. Audio and video AI generation can be categorized into three major types: cloning (including DeepFake), intelligent editing, and autonomous creation. Additionally, generative AI applications in program code, virtual humans, and robot control are gradually being implemented. The enhancement of media modality affordance has led to the emergence of numerous "AI writers," "AI painters," "AI programmers," and "AI idols," continuously expanding industry application scenarios and business models.

From the perspective of interaction language affordance, although mainstream AIGC products including ChatGPT support multilingual interaction, content outputs obtained from different language inputs exhibit significant differences in response speed, response probability, and output accuracy. Since the language corpora covered in AIGC products' underlying training databases are predominantly English, the information affordance for English instructions is often stronger. Testing reveals that for the same question, using Chinese versus English input instructions yields different results, with English responses

generally being more detailed and better matched to the question. This is particularly true for professional domain content output, where English interaction typically produces superior results.

Furthermore, the carrying capacity of AIGC products significantly affects their affordance. Constrained by computing resources, mainstream AIGC products currently face limitations in user capacity and interaction response efficiency. Taking ChatGPT as an example, its global user base has exceeded 100 million, with average daily unique visitors surpassing 10 million and peak requests reaching hundreds of millions. Since its explosive popularity in February 2023, it has long operated at "full capacity," with system "crashes" occurring several times, and restrictions placed on interaction frequency for individual users. Computing power, algorithms, and data serve as the three foundational pillars of AIGC, jointly determining product affordance. Only by reducing the marginal cost of computing resources while continuously optimizing algorithms and refining data granularity can AIGC achieve usability on the basis of availability.

2.2 Content Usability

According to Nielsen' s usability framework, usability primarily comprises five attributes: learnability, memorability, efficiency, error rate, and satisfaction. For internet applications, security and privacy are also frequently considered [6]. Learnability refers to the threshold for initial contact and use, memorability to how quickly proficiency can be restored upon reuse, efficiency to the speed at which users complete tasks, error rate to the frequency of bugs, and satisfaction to users' subjective perception. For AIGC products, learnability, memorability, and efficiency are currently at relatively high levels. The key metrics affecting usability are content error rates and user subjective experience, particularly the accuracy, error rate, professionalism, and redundancy of the content itself, which significantly influence users' perceived usability.

In terms of content accuracy, since AIGC's output capabilities derive from large-scale learning rather than algorithmic innovation, its content output is limited by its training corpus and cannot accurately respond to instructions beyond the training set, sometimes even providing irrelevant answers. For questions within the scope of the training corpus, AIGC' s output accuracy is directly related to the precision of user instructions. If the instruction question has a unique answer, AIGC can guarantee nearly 100% accuracy in its feedback. For questions without specific answers, users need to employ hierarchical progressive questioning to obtain accurate feedback. Additionally, limited by the timeliness of training sets, some feedback content exhibits obvious lag issues (for example, some of ChatGPT's training data is current only up to 2021), which significantly impacts content usability.

Regarding content error rates, AIGC products including ChatGPT conduct real-time optimization and feedback based on large model training. Compared with traditional deep learning models, large models' in-context learning capabilities

enable them to exceed original training corpus limitations, continuously learning during user interaction and performing on-the-spot "error correction" to optimize feedback results. For instance, when users directly point out problems in ChatGPT' s feedback or question and criticize its output, it temporarily adjusts and corrects its output based on user feedback. While this continuous iteration and self-correction can reduce AIGC error rates to some extent, because the quality of user interaction content itself is difficult to guarantee, it often results in "compounding errors." This places higher demands on users' own media literacy, knowledge reserves, and critical thinking.

From the perspective of content professionalism and information redundancy, vertical AIGC targeting specific domains often demonstrates good professionalism, particularly in fields with high knowledge structuring, high-quality training sets, and strong specialization such as medicine, law, finance, and programming. Interactive Q&A and content generation based on generative AI can substitute for foundational work to a certain extent. However, for general-domain AIGC products, testing reveals that mainstream AIGC products currently output relatively moderate and conventional content with substantial redundant information, leaving room for improvement in providing information increments and exceeding general cognitive levels.

Overall, compared with traditional information retrieval and interactive Q&A products, AIGC can actively memorize historical interaction information and understand context, continuously improving content accuracy, correctness, and professionalism during continuous interaction and optimizing user experience based on contextual interaction scenarios. On the other hand, it greatly enhances user information retrieval and content organization efficiency, and can provide corresponding suggestions for instructions beyond its scope, demonstrating stronger openness, flexibility, and growth potential than traditional information products.

3. Risk Regulation: From Malleable to Trustworthy

As AIGC accelerates development and rapidly penetrates various industries, it has also generated a series of security issues including false information, misinformation, privacy violations, ethical concerns, and copyright management. These involve training corpora, algorithmic models, interaction instructions, and content dissemination across the entire chain, making comprehensive content risk management necessary. From a risk regulation perspective, continuous optimization of back-end algorithmic models and underlying data is required on one hand, while front-end content output and interaction functions must be standardized and constrained on the other, achieving trustworthy content output on the basis of malleable algorithmic models.

3.1 Model Malleability

Since Google released the BERT natural language processing pre-training model in 2018, AIGC applications have entered the era of large models. Compared with early machine learning models, large models are generally based on self-supervised learning from massive data, possess enormous parameters, can rapidly extract features, and enable multi-task, multilingual, and multimodal information processing. Although current mainstream generative AI model parameters have exceeded hundreds of billions (Figure 1 [Figure 1: see original paper]), it is noteworthy that larger parameter scale does not necessarily correlate with better AIGC performance. For example, GPT-3.5 has 13 billion parameters, far fewer than GPT-3' s 175 billion parameters, yet it demonstrates significantly superior performance in feedback content accuracy and ethical behavior compared to GPT-3.0. This approach of big data pre-training and small data fine-tuning eliminates dependence on frequent manual parameter adjustment, making generated content more natural while enabling reinforcement learning based on user feedback during interaction—that is, continuous self-correction and iteration of its own errors.

Taking ChatGPT as an example, its introduction of RLHF (Reinforcement Learning with Human Feedback) technology makes model output content more malleable, allowing AIGC to align with human common sense, cognition, needs, and even values to a certain extent. This model training paradigm enables faster AI self-evolution, allowing it to respond to user needs more quickly and accurately through continuous learning and adapt to user interactions in more scenarios. However, it also increases the "discipline" risk of AI itself. In addition to pre-training corpora, information "fed" to the model during human-computer interaction is also digested and affects subsequent content output. Once large amounts of erroneous information, risk information, and biased information are used for model reinforcement learning through human-computer interaction, corresponding transmission risks will be amplified. Malicious manipulation behaviors behind the new model paradigm also require vigilance.

3.2 Content Credibility

If algorithmic model malleability is the implicit factor affecting AIGC risks, then output content credibility is the explicit factor determining AIGC application risks. Existing research indicates that AIGC has exacerbated the spread of disinformation and misinformation to a certain extent [8]. AIGC applications including DeepFake have become so realistic that most audiences find it difficult to distinguish AI-generated content from human-generated content at the visual level [9]. Although AIGC-related algorithms themselves have no inherent moral attributes, this technology has been widely used for negative purposes such as political manipulation and unfair business competition [10]. Moreover, as more generative AI models are open-sourced, the resulting false information, misleading information, and biased information pose risks to international politics, society, and human rights development [11]. To enhance AIGC credibility,

it is necessary to ensure content quality at the source level as much as possible while also constraining and alerting potential risk factors at the application interaction level.

Examining the information sources currently used by general-domain AIGC products, their limited professionalism further affects the credibility of content output. Taking ChatGPT as an example, 60% of its training data comes from the Common Crawl dataset, which encompasses data collected since 2018 from major global open-source websites, social media platforms, Wikipedia, government websites, etc., with blog platforms (18.69%) and Wikipedia (13%) occupying substantial proportions. This content, dominated by ordinary user generation, cannot be guaranteed in terms of credibility. Beyond text AI, training data for current typical image AIGC products mostly comes from major open-source platforms. For instance, approximately 8.5% of Stable Diffusion' s billions of image training dataset comes from the large image-based social network Pinterest, and 6.8% from WordPress, while also covering various shopping platforms and blogs [12]. Unclear copyright licensing of training datasets also exposes AIGC to copyright disputes. Additionally, ChatGPT currently has restrictions on accessing information from mainstream media outlets in various countries. Although it can obtain some information and viewpoints from partial open-source websites, it cannot systematically access relevant information for training and learning. The uneven quality of source content also affects the stability of its output content quality.

Beyond content risks hidden in training datasets, malicious use at the interaction end can also make AIGC a booster for false and erroneous information. The American news credibility assessment and research organization NewsGuard tested ChatGPT and found that when asked to respond based on conspiracy theories and misleading information, it provided feedback in 80% of cases. Furthermore, when testers asked ChatGPT to write news based on false information, it could rapidly generate large amounts of seemingly convincing content without clear sources, with news structure and narrative techniques approaching professional levels, but the content itself was filled with misinformation and false citations [13]. Improper training and malicious use of AIGC can facilitate the spread of false information, placing higher demands on users' media literacy and critical thinking. Research finds that compared with the critical attitudes of European and American users toward AIGC, Chinese users demonstrate more positive attitudes toward AIGC applications [14], with users in some scenarios perceiving algorithm-generated news as more credible than news by human journalists [15], further increasing the necessity of AIGC risk regulation.

In addition to content credibility, issues including privacy concerns, copyright problems, addiction problems, micro-political discrimination, "high-tech plagiarism" and academic misconduct caused by improper use, as well as unfair business competition and cyber fraud and attacks resulting from malicious use, have all become risks faced by AIGC in multi-scenario applications. While fully utilizing AIGC' s technological dividends, confronting its derived negative ex-

ternalities is also necessary for achieving sustainable and healthy development of the AI technology ecosystem.

4. Evolution Trends: From Replaceable to Promising

As deep learning enters the large model stage, AIGC has broken the predefined rule-based model of early AI-assisted production, with content generation evolving from "intelligent editing" to "intelligent creation." The transformation of content production paradigms from AI-assisted editing to AI-assisted production and then to AI autonomous creation has brought enormous impact to the information industry. Low-cost, high-efficiency, and large-scale applications have also enhanced the replaceability of certain occupations. Finding the optimal balance point and collaboration model in human-machine coordination has become an issue that AIGC needs to explore for future high-quality development and multi-domain application.

4.1 Occupational Replaceability

Before large-scale AI application, it was generally believed that simple, repetitive manual laborers faced higher replacement possibilities by technology than mental laborers. With the deepening application of AI in information organization and knowledge production, AI has initially possessed creative capabilities under the support of large models like GPT-3. Beyond auxiliary production work such as error correction, simple Q&A, automatic translation, material integration, and auto-filling, it has also demonstrated high adaptability and creativity in entirely new content creation, artistic production, and code programming. An Oxford University analysis in 2017 of over 700 occupations' AI replacement rates indicated that nearly half of occupations would disappear within the next 10 years, with 47% of people facing unemployment risk [16]. Moreover, besides low-skill assembly line work, professional occupations including translation, sales, and even doctors and writers face "human-machine handover" risks [17].

Taking the media industry as an example, statistics as early as 2016 indicated that machine news annual output had exceeded 1 billion articles, particularly in finance, sports, and natural disasters where machines' templated generation capabilities were already quite mature. Numerous mainstream media institutions domestically and internationally have also developed or introduced machine news products for production and application. Beyond conventional templated production, open-ended and autonomous news production led by ChatGPT has gradually penetrated the media industry. Testing reveals that news generated by ChatGPT is highly similar to current professional news writing in terms of structure, framework, logic, and narrative language, typically containing factual elements, viewpoints, and quotations, and conforming to the inverted pyramid writing structure. Although AIGC' s production efficiency and scalability far exceed human writers, machine news readability is often inferior compared to human-written news, and emotional interaction is relatively weak. Due to

ethical, emotional, flexibility, and other factors, most scholars currently hold negative attitudes toward machines completely replacing human writers [18].

Furthermore, AIGC' s substitution for human creative work has caused controversies about "high-tech plagiarism." How should copyright be defined for works generated using AIGC? Can "machine author" identity be recognized? How should attribution and infringement accountability issues for AIGC works be handled? Many issues remain unresolved. Particularly in academia, the misuse of AIGC has already been classified as "academic misconduct" by some institutions, with over a hundred academic journals stating they will completely ban or strictly restrict the use of AI like ChatGPT to write academic papers.

4.2 Application Promise

Beyond its replaceability for existing occupations, AIGC' s powerful production and creative capabilities also pose challenges to various Internet applications in the Web2.0 era. Current mainstream AIGC products already possess multiple functions including interactive Q&A, information retrieval, content generation, language translation, program writing and debugging, environment simulation, data processing, creative generation, and reasoning analysis. To a certain extent, they can replace existing search engines, translation software, programming tools, copywriting tools, etc., becoming an integrated "toolbox" with multiple practical functions. As AIGC expands and optimizes its modalities, application scenarios, and technology ethics, it will also challenge current social media, news information, and game engine applications, reconstructing not only future occupational structures but also the global Internet ecosystem.

In the Web3.0 context, AIGC is poised to become the content engine and underlying tool for metaverse construction. With the maturation and large-scale application of technologies such as AI-generated 3D models, AI-generated virtual humans, AI-driven robots, AI-generated digital works, AI-driven digital twins, AIGC will play important roles in three-dimensional space construction, digital soul creation, and digital asset minting. This will also significantly lower the construction threshold and marginal costs of the metaverse, accelerating its deep application at G-end, B-end, and C-end levels.

Compared with breakthroughs in generative AI at the technical level, its potential at the application level is even more promising. Large models including GPT-3, CLIP, and Diffusion had already been applied in professional fields before 2022, but ChatGPT's explosion in popularity has transformed these AI technologies from niche to segmented and mass markets, releasing application value and moving industrial scale toward exponential growth. ChatGPT has driven the great development of AIGC application scenarios. Beyond widespread application in Internet, media, education, film and television, and finance, it also possesses enormous application space in government services, industry, healthcare, and other fields.

In summary, on the eve of AIGC' s explosive growth, we should adopt an

objective, neutral, inclusive, and prudent perspective toward technological development. While "disempowerment" certainly exists, "empowerment" is even more promising. By remaining vigilant about technological risks, standardizing ethical constraints, and continuously expanding connection points with different industries, we can achieve replaceability and promise on the basis of availability, usability, malleability, and trustworthiness.

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Note: Figure translations are in progress. See original paper for figures.