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Frugal AI-Generated Art: A Poetic Form and Ethical Choices

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Abstract. Generative artificial intelligence has transformed the production of visual art and design, while also raising concerns about energy consumption, copyright, visual homogenization, and the weakening of creators' subjectivity. In response to the tendency to measure artistic value by model scale, computing power, output precision, and production volume, this paper proposes the concept of "frugal AI-generated art." In this approach, creators deliberately limit model scale, data volume, generation frequency, output precision, and visual complexity. Rather than treating these limits as technical shortcomings, they turn resource constraints into artistic forms and expressions of value. Frugal AI-generated art is therefore not a passive downgrade or a rejection of technological development. Instead, it uses deliberate limitations to stimulate creativity and to moderately reconstruct the relationship between human creators and computational systems. By foregrounding the creative potential of constraint, this concept offers an alternative to the assumption that greater technical capacity and higher output necessarily produce greater artistic value. It invites consideration of how choices about resources and visual form can shape both the creative process and the values expressed through AI-generated art.

Keywords: Frugal AI, Artificial Intelligence, Form Poetics, Art Design

1. Introduction

Generative artificial intelligence has been widely applied in the field of visual communication, but the increase in quantity does not necessarily lead to an enhancement in artistic quality. The participation of artificial intelligence in the production, selection, and recombination of cultural materials is reshaping people's aesthetic experiences. At the same time, the expansion of computational power and repeated generation brings energy consumption, making material conditions such as resources, data, and human labor increasingly significant. Existing research often focuses on technical capabilities, copyright, and general ethical issues, while discussions on how resource constraints transform into artistic forms remain insufficient. Based on this, this paper proposes the concept of "frugal AI-generated art," referring to the conscious control by creators over model selection, data usage, computational input, generation frequency, and formal complexity, so that constraints become not only external conditions of creation but also internal factors in the generation of meaning in the work. Here, "frugal" is not synonymous with low quality or minimal style, but represents a proactive choice that spans resources, data, operations, and formal levels. This paper examines visual languages such as white space, low fidelity, repetition, and chance, guided by

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formal poetics and ethical analysis, and discusses issues of energy responsibility, data rights, creator subjectivity, and technological fairness, thereby demonstrating how resource constraints can become conditions for formal creation and ethical judgment [1].

2. From computational power expansion to frugal generation

Generative artificial intelligence has lowered the technical threshold of image production. With the help of natural language prompts and reference images, creators can quickly obtain a large number of visual results, and related technologies have also entered the fields of visual communication such as posters, illustrations, fonts, brand images and moving images. Manovich points out that artificial intelligence not only participates in the production of cultural materials, but also intervenes in their analysis, selection and recombination, thus influencing contemporary aesthetic experience.

However, the improvement of generation efficiency does not necessarily lead to a synchronous improvement of artistic quality. Current AI art, to a considerable extent, follows the logic of scale expansion: model parameters, data volume, output precision and generation quantity keep growing, while creators search for ideal results by frequently modifying prompts and batch output. In this process, a large number of images are discarded without being used, and creation may also shift from the study of themes and forms to repeated trials of system probabilities.

Although AI images exist in digital form, they rely on computing devices, data centers, electricity and cooling systems. Relevant studies show that large-scale machine learning training has real energy costs, and its impact is closely related to models, hardware and energy structures [2]. Crawford further points out that artificial intelligence is a material system composed of natural resources, data, infrastructure and human labor, rather than a neutral algorithm detached from reality [3].

At the aesthetic level, mainstream AI images generally pursue complex light and shadow, fine texture and style mixing, and tend to regard more details as artistic progress. This not only leads to visual homogenization, but may also replace designers' formal judgment with platform presets. Based on these issues, this paper proposes "frugal AI-generated art", focusing on how resource constraints form a visual language and what ethical stance this language embodies.

3. Concept and theoretical basis of frugal AI-generated art

3.1. Connotation of frugal AI-generated art

"Frugality" in AI-generated art mainly includes four dimensions: first, resource frugality, that is, reducing unnecessary consumption of computing power, energy, storage and equipment; second, data frugality, that is, giving priority to the use of moderately scaled, screened and clearly sourced data; third, operation frugality, that is, reducing aimless prompt testing and repeated generation; fourth, formal frugality, that is, limiting the number of colors, compositions, textures, sizes and visual elements.

Accordingly, this paper defines frugal AI-generated art as an artistic practice in which creators consciously control models, data, computing power, generation times and formal complexity, and transform resource constraints into the language and value stance of the work.

Frugality is not equivalent to low cost, low quality or minimalist style. Whether a work is frugal depends not on whether its appearance is simple, but on whether the constraints are consciously designed and participate in meaning generation. If a work with simple form is still based on a large number of invalid outputs, it may not conform to the principle of frugality.

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3.2. Constrained creation and formal poetics

Formal poetics focuses on how works generate meaning through structure, materials, media and rules. Shklovsky argues that art can change habituated modes of perception and make everyday objects noticeable again, a mechanism generally summarized as "defamiliarization" [4]. In a visual environment full of high-definition, full and smooth images, blur, incompleteness and blank space may instead constitute new forms of defamiliarization.Constraint is not the opposite of creativity. Prints with limited colors, rule-based literature and algorithmic art all demonstrate that constraints can narrow the scope of invalid choices. Boden and Edmonds point out that generative art usually involves artists setting rules or systems, which then participate in the generation of works with a certain degree of autonomy [5]. Therefore, its value lies not only in the final image, but also in the process of rule setting, operation and selection.

Frugal AI art extends constraints to models, data, computing resources and generation times. When creators stipulate that only one model, one small dataset and a limited number of outputs can be used, technical boundaries transform from external obstacles into internal formal rules of the work.

4. Formal poetics of frugal AI-generated art

4.1. Constraint, simplification and blank space

Mainstream AI platforms provide users with nearly unlimited models, parameters and output opportunities, but the more choices there are, the more likely creators are to fall into continuous comparison. Since the next generation always seems to produce better results, it is difficult for works to reach a clear stopping point. Frugal generation changes this logic by limiting models, keywords, generation times and output sizes, forcing creators to form ideas before generation and treat each output carefully. "When to stop" thus becomes part of creation.

In visual communication design, creators can also preset the number of colors, grids, fonts and graphics, so that AI only generates limited variants within the established system. This method can control formal expansion and prevent accidentally generated images from dominating the entire design process.

AI images often rely on high-density details to create immediate appeal, but more information does not mean more effective communication. Frugal generation establishes a clear information hierarchy by reducing subjects, compressing colors, weakening depth and deleting decorative details. Blank space gives positive meaning to the "ungenerated part": it not only regulates visual rhythm, but also reserves space for the viewer's association. Designers can retain only the partial outline of the generated image and convert the rest into text, solid colors or grids, so that the AI image no longer becomes the absolute center of the layout.

4.2. Incompleteness, noise and lo-fi

Pixelation, blur, shape variation and texture repetition are usually regarded as technical errors that need to be fixed, but frugal AI art can consciously retain these phenomena. Low resolution, small models or limited data may produce fragmented and unstable visual results, weaken the realistic illusion of images, and make viewers aware that the work is an artificial structure composed of data, algorithms and probabilities.

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However, errors do not inherently have artistic value. Only through selection, organization and redesign can noise become form. Creators can crop misaligned images into abstract graphics, or convert compressed color blocks into layout texture. Hertzmann points out that discussions about the creativity of computer art need to distinguish between system output and human artistic judgment, and complex machine results cannot be directly equated with complete artistic creation [6]. Therefore, the choice of whether to keep or discard generation errors reflects the creator's subjectivity.

4.3. Repetition, circularity and contingency

Frugal generation opposes treating every project as image production starting from scratch. Existing outputs, including unused failed images, can enter a new creation process through cropping, collage, compression and re-typesetting. The same image can be converted into poster backgrounds, book textures, font structures or moving materials. Recycling can not only reduce generation times, but also retain the traces of image compression, loss and deformation.

AI generation is random, but contingent results do not automatically constitute art. Frugal creation does not eliminate contingency through infinite output, but negotiates with it within a limited number of times. The model is responsible for providing possibilities, while creators are responsible for setting rules, selecting results, organizing text-image relationships and deciding when to stop. Human subjectivity shifts from directly making every detail to controlling generation boundaries and final meaning.

5. Ethical choices of frugal AI-generated art

5.1. Energy and environmental responsibility

The training, inference, storage and transmission of artificial intelligence models all require real energy. Although there are obvious differences between different models and usage environments, and a unified carbon emission value cannot be determined for a single image without measurement, high-frequency and aimless batch generation will still cause cumulative resource consumption.

Technology enterprises should improve the transparency of energy and infrastructure information, and creators should also select models and output precision according to communication needs, give priority to editing existing materials, and reduce invalid generation. Frugality should not be understood as producing more content with fewer resources, but should aim at reducing unnecessary production. Otherwise, efficiency improvement will only expand image output and create new resource waste.

5.2. Data rights and cultural responsibility

Generative models may use data with opaque sources, involving issues such as copyright, personal information, bias and cultural appropriation. Creators should give priority to original, self-built, public domain or legally authorized materials, and record the main data sources. For ethnic patterns, religious symbols and local cultural resources, their historical context and group rights should also be respected, and indiscriminate commercialization after extracting them from their context should be avoided.

Small datasets are also not inherently ethical. If samples are biased, the model may still reproduce stereotypes. Therefore, data frugality means not only reducing quantity, but also improving

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authorization transparency, sample quality and cultural sensitivity. UNESCO proposes that artificial intelligence applications should follow the principles of transparency, fairness, sustainable development, human oversight and cultural diversity, and these principles also apply to AI art practice [7].

5.3. Subjectivity, labor and technological equity

AI can undertake tasks such as sketching and formal variants, but it may also make designers rely on platform presets. When creators keep changing prompts but cannot explain the composition logic of images, their judgment is likely to give way to system probabilities. The frugal approach requires clarifying communication goals first, then judging whether AI is needed, and retaining manual links such as photography, painting, collage, typesetting and printing.

Nor can AI be regarded as a system that operates independently of human labor. Behind it lie labor such as data collection, annotation, review, software development and facility maintenance. Therefore, frugal generation does not require designers to produce more works in less time, but reduces invalid outputs and reserves necessary time for research, communication, cultural understanding and ethical judgment.

In addition, high-performance equipment, paid subscriptions and closed platforms may widen the resource gap among creators. Lightweight models and open-source tools help improve technological accessibility, but true equity also includes whether users can understand tools, control data, exit platforms and express different cultural experiences.

Accordingly, frugal AI art can follow six ethical principles: necessity, moderation, transparency, respect, subjectivity and sustainability. Creators should not only judge whether the work is effective, but also explain why AI is used, how many resources are consumed, where the data comes from, and which key decisions are made by humans.

6. Conclusion

Frugal generation in visual communication design can be divided into five steps: first, clarify the audience, media and communication purpose, and avoid using AI itself as the creation goal; second, preset resource boundaries such as models, data, generation times and output precision; third, limit colors, grids, fonts and compositions, so that AI outputs enter a unified formal system; fourth, regard generation results as materials, and complete redesign through cropping, collage, typesetting and media conversion; fifth, check data authorization, cultural context, resource consumption and human-machine division of labor, and appropriately disclose the participation mode of AI.

In conclusion, frugal AI-generated art is not a passive downgrade caused by insufficient technology, but an active practice that transforms resource constraints into formal creation and ethical judgment. Through simplification, blank space, incompleteness, noise, repetition and circularity, it forms a formal language different from high-definition spectacles and visual saturation. Constraints are no longer just obstacles to creation, but conditions for generating defamiliarization experience and media self-consciousness.

Frugal generation also shows that technical operation itself contains ethical choices. Model scale, data sources, generation quantity and AI participation disclosure all involve energy, copyright, labor, culture and technological power. Therefore, the evaluation of AI art should not only focus on the final effect, but also examine its production process and social cost.

What frugal AI art advocates is not simply "using less AI", but using AI more consciously: responding to real problems with appropriate technology, forming clear expression with limited

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resources, maintaining creators' subjectivity with transparent human-machine relationships, and taking responsibility for the environmental and social impacts of technology. In an era of expanding generation capacity, artistic value is reflected not only in how many images can be created, but also in how many unnecessary images can be rejected.

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