

Disrupting the Conventional: The Impact of Generative AI Models on Creativity in Visual Communications

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Abstract: The advanced generative artificial intelligence (AI) models can significantly transform visual communications by presenting new prospects for creativity and innovation. This article examines the influence of generative AI on the creative processes in visual communications, assessing the possible benefits and obstacles that emerge when using AI-generated material. By leveraging current academic work, we argue that the phenomenon of steady dissemination has the potential to disrupt conventional creative processes by equipping users with novel tools and approaches for exploration. Nevertheless, it is important to highlight the potential drawbacks of relying too much on AI-generated material and underline the crucial role that human intervention plays in maintaining creativity and authenticity. Furthermore, we analyze the ramifications of the steady diffusion on the future of visual communications and the significance of human creativity in a swiftly changing global landscape.

Keywords: Generative AI; Creativity and computational creativity; Intelligence and Trust

Resumo: Os modelos avançados de inteligência artificial (IA) generativa podem transformar significativamente as comunicações visuais, apresentando novas perspectivas de criatividade e inovação. Este artigo examina a influência da IA generativa nos processos criativos das comunicações visuais, avaliando os possíveis benefícios e obstáculos que surgem quando se utiliza material gerado por IA. Aproveitando o trabalho académico atual, defendemos que o fenómeno da disseminação constante tem o potencial de perturbar os processos criativos convencionais, equipando os utilizadores com novas ferramentas e abordagens de exploração. No entanto, é importante realçar os potenciais inconvenientes de confiar demasiado em material gerado por IA e sublinhar o papel crucial que a intervenção humana desempenha na manutenção da criatividade e da autenticidade. Além disso, analisamos as ramificações da

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difusão constante no futuro das comunicações visuais e a importância da criatividade humana numa paisagem global em rápida mudança.

Palavras-chave: IA generativa; Criatividade e criatividade computacional; Inteligência e confiança

1. **Introduction:**

The field of AI has long been driven by two distinct objectives:

- Leveraging insights from the psychological sciences to enhance computer science;
- Utilizing computer science to advance our understanding of the psychological sciences (Bryson, 2019).

The rapid progress of digital and technological innovation has brought about profound changes in our capabilities and the consequences of our daily actions, leading to a significant societal transformation (Tai, 2020). This transformation has had a particularly notable impact on the field of visual communications, which has witnessed a remarkable evolution with the emergence of generative AI tools. By examining the interplay between technology, creativity, and audience engagement, we seek to uncover the transformative effects of generative AI on the conceptualization and production of visual content (Sayers, 2014).

As humans, we perceive ourselves as the most intelligent beings in the known universe. This self-perception leads us to identify as rational creatures capable of solving a vast array of complex problems, relying on our experiences, intuition, and the application of logical reasoning, decision analysis, and statistical principles. Consequently, it can be challenging for us to entertain the notion that our intelligence may not be as superior as we often believe it to be (Korteling et al., 2021). The efficacy of AI technology becomes apparent via advancements in the processing of massive amounts of data, the use of deep-learning algorithms, and the augmentation of machine-learning capabilities to acquire knowledge in a shorter duration compared to human counterparts (Yaghy, 2019). This groundbreaking novelty has ushered in a revolutionary era of visual communications, where machines are capable of representing social subjectivity within the structural framework, challenging the previous phase characterized by oppressive and stagnant superstructures that imposed limitations on machine effects (Guattari, 1984).

2. **Artificial Intelligence:**

“The original vision of AI was about the automation of cognition. Today, AI also plays a crucial role in culture, increasingly influencing our choices, behaviors, and imaginations (Manovich, 2018).”

In this section, we will adopt a well-established definition of intelligence rooted in the foundational research on animal behavior. Intelligence can be understood as the capacity to

appropriately respond to the demands of a given context, making the right decisions at the right time. This definition serves to demystify intelligence and, by extension, Artificial Intelligence (Bryson, 2019). The conceptualization of intelligence, which refers to the capacity to autonomously and effectively accomplish intricate objectives, is an evolving process that has been progressively limited to activities deemed exclusive to humans (Korteling et al., 2021). While intelligence alone does not encompass the entirety of human essence, it undeniably holds a significant position in shaping various facets of our lives. From our innate survival instincts to our conscious self-perceptions, intelligence plays a crucial role. Furthermore, intelligence serves as an integral component within the social structures that form the foundation of modern civilization (Yaghy, 2019).

Despite the presence of various definitions, AI is widely understood as a technological field that harnesses the power of computers and machines to aid humans in problem-solving and boost productivity (Adiguzel et al., 2023). AI systems are specifically designed to analyze data, recognize patterns, and also make informed decisions or carry out tasks that have traditionally relied on human intelligence, the reality is that artificial intelligence has arrived in the present, and many of us regularly interact with the technology in our daily lives (Dwivedi et al., 2019). If, in a traditional sense, media are extensions of human senses, then AI is a further extension of human capabilities in mediating between us and the world (Manovich & Arielli, 2022). Through the utilization of sophisticated algorithms and computational prowess, AI holds the potential to enhance human capabilities and bring about transformative changes across diverse domains (Trunk et al., 2020). The rapid advancement of AI holds immense potential to provide enhanced support, although ongoing research is still exploring its full capabilities. As AI is designed to surpass the capabilities of traditional machines, there is a growing awareness of the potential impact on task allocation and the established roles within the human-machine relationship (Trunk et al., 2020). Discussions surrounding these effects are gaining momentum as we strive to navigate the evolving landscape of AI technology.

AI is a highly debated topic in contemporary discourse, yet there remains a lack of consensus regarding the distinctions and parallels between human intelligence and artificial intelligence. Discussions surrounding crucial aspects like trustworthiness, explainability, and ethics often exhibit implicit anthropocentric and anthropomorphic perspectives, with a tendency to prioritize human-like intelligence as the ultimate benchmark for AI (Korteling et al., 2021). Although, it is essential to recognize that AI was not designed to replace human intelligence but rather to act as a tool that enhances and expands our cognitive capabilities (Dwivedi et al., 2019). AI systems possess remarkable abilities to analyze vast amounts of data, detect patterns, and provide insights at an unprecedented speed and scale (Hassani et al., 2020). However, they still lack the nuanced understanding, creativity, and contextual awareness that human intelligence brings to complex and multifaceted situations (Maetschke et al., 2021). With the advent of AI, machines are expected to not only act and react but also potentially alter the dynamics of the human-machine relationship (Huang & Rust, 2018).

As AI continues to advance, it is crucial to address the ethical implications and societal impact of its implementation. A significant amount of literature has emerged on the topic of AI ethics in recent times. However, a considerable portion of this discourse has regrettably overlooked both the scientific aspects of computability and the social science implications of how increased access to information and mechanical computational power has transformed human lives and behaviors. Instead, much of the focus has been on AI as a thought experiment or an 'intuition pump' through which we can better understand the human condition or the nature of the ethical obligation (Bryson, 2019). Concerns regarding privacy, bias, accountability, and the potential

displacement of human labor arise as AI becomes more integrated into our daily lives. Achieving a balance between harnessing the potential of AI and ensuring its responsible and ethical use is a critical challenge that necessitates ongoing dialogue and collaboration among researchers, policymakers, and society as a whole (Bryson, 2015).

3. Visual communications:

Throughout human history, there has been a prevailing tendency to approach visual representations with a sense of skepticism and question their reliability. According to Siegesmund (2017), Plato argued that visual representations were intrinsically misleading, functioning as simple imitations that failed to fully grasp the authentic nature of reality. As a result, those who were involved in the production and distribution of visual representations were seen as untrustworthy impostors (Siegesmund, 2017).

Currently, there is an observable transformation occurring in the realm of modern visual culture. According to Synakh et al. (2021), there is an ongoing shift from the conventional logical, Cartesian, linear, and language-based culture, to a culture that places more emphasis on visual and creative modes of expression. This phenomenon progressively acquires further cultural and social territory. The use of visualization and visuality extends beyond creative thought and the development of new realities, including communication and daily life (Synakh et al., 2021). The current era is seeing rapid shifts in the realms of politics, business, and culture. Art and design have a significant influence on several facets of our lives, molding and affecting them. The expansion of visual communication design is anticipated to undergo significant growth in the near future (Yang & Yang, 2022).

The phrase "visual communication" is commonly used in colloquial discourse that encompasses a broad array of media including web material, television, cinema, photography, and painting. Nevertheless, it is crucial to acknowledge that the word "visual communication" is vague and might result in misinterpretations (Mitchell, 2005). It is important to realize that visual communication comprises a far wider array of activities and disciplines. Visual communication has undergone significant transformation in the present-day context, emerging as a multifaceted field that effectively amalgamates technology and artistic elements (Feng & Cao, 2020). The proliferation of diverse technologies has not only led to the emergence of novel modes of representation but has also spurred a transformation in design ideas and cognitive methods. The use of visual representation, which involves the use of visual symbols to communicate information, is a very effective approach and medium (Walsh, 2021). To optimize visual communications holistically, it is crucial to have a profound comprehension of human cognitive processes, which include our perceptual experiences and logical thought processes. The use of an integrated method enables the alignment of visualizations with our cognitive capacities, so assuring that the presented information has both visual appeal and ease of comprehension (He, 2022).

In contemporary culture, there has been a notable emphasis within new media platforms on the conversion of pictures into representations of conduct, diminishing humans to mere entities (Flusser, 2002). Nevertheless, it is possible to establish alternative connections between them. According to Flusser (2002), the emergence of new media has the potential to redefine the connection between images and their associated meanings. This shift in dynamics allows people to actively engage in both the creation and interpretation of significance. The use of this

participatory procedure facilitates a heightened sense of inclusivity and engagement, whereby people actively participate in the generation and interpretation of the material. This dynamic fosters a more profound connection and comprehension between media and its audience (Ellis & Goggin, 2015). The advent of the digital revolution has led to the incorporation of visual communication as a fundamental component in our everyday existence. The increasing prominence of visual imagery in many domains (such as social media platforms and advertising efforts) underscores its profound ability to engage, educate, and influence people. Nevertheless, the visual communication domain is now experiencing a significant metamorphosis due to the fast progressions in technology. AI technologies, such as computer vision and machine learning, have brought about a significant transformation in the way visual material is generated, consumed, and engaged with (Manovich, 1998). It is imperative to recognize that, notwithstanding the advent of the digital revolution, there exists a basic characteristic of images that remains unaltered: their inherent quality as visual stimuli for individuals, who are embodied human beings with typical sensory and perceptual capacities (Mitchell, 2017). The advent of the digital age has led to notable progress in the creation, dissemination, and alteration of images. However, it is important to recognize that the fundamental process of seeing and understanding images is still deeply connected to our physical presence in the world (Drummond et al., 2012). The human sensory and perceptual apparatus (which has undergone evolutionary development) remains influential in our interaction with visual stimuli. Hence, it is critical to acknowledge and contemplate the continuing human encounter with pictures, especially in the face of technological advancements. This entails ensuring that our comprehension and usage of visual media are following our inherent perceptual capacities (Niedenthal et al., 2005).

When visual communications are treated properly, they provide a potential means to surpass the conflicts and tensions that arise with visual perception (Mitchell, 2005). This platform provides an opportunity for scholarly exploration and analysis of the intricate relationships and interactions between the visual domain and our many sensory faculties. The emergence of novel visual media necessitates the creation of a new critical lexicon that can proficiently articulate, examine, and instruct on its distinctive attributes (Manovich, 1998). Merely depending on technical terminology such as AI to describe works that exhibit substantial variations in purpose and structure is inadequate. Concurrently, it might be argued that conventional cultural conceptions and forms are insufficient in effectively encapsulating the fundamental nature of emerging media. The reinterpretation of concepts such as image and spectator, narrative and montage, illusion and representation, space and time is necessary. To develop a complete and rigorous framework to analyze new media, it is essential to draw meaningful linkages between well-established cultural and theoretical notions and those that pertain to the structure and functioning of digital technology (Manovich, 1998).

4. Generative Image Creation Models:

The concepts and frameworks related to the dispersion and recognition of ideas and models, which emerged throughout the latter part of the 20th century, are very important in contemporary times. The theories discussed above have a vital function in enhancing comprehension of the intricate dynamics linked to the implementation of technology (Martins et al., 2021). In the last two decades, significant advancements have occurred in the field of AI, resulting in its revival as a well-developed discipline within the domain of information technology (Martins et al., 2021).

In this article, we have opted to provide this portion in a basic manner, intending to comprehend the fundamental concepts of generative AI models, while avoiding complex technical intricacies. The aforementioned models, referred to as diffusion models, are resilient generative models that develop an understanding of data distributions by an iterative process of reducing noise in variables sampled from a Gaussian distribution (Carlini et al., 2023).

Generative AI models have garnered considerable interest in the field of image noise reduction attributed to their notable simplicity and efficacy. During the training process, these models use a clean image as a basis and generate a noisy image by sampling a time-step and a Gaussian noise vector. The model uses a diffusion process with a fading parameter to eliminate noise and restore the initial image. This is achieved by forecasting the introduced noise by stochastic minimization of an objective function, as described by Chen et al. (2023). The use of these models has had a substantial influence in diverse domains, including computer vision and medical imaging. The efficacy of such models, including DALL-E, Imagen, and Stable Diffusion, in producing synthetic images of exceptional quality has attracted significant recognition in the field (Carlini et al., 2023).

The aforementioned models have been used in many tasks, including semantic segmentation, image-text production, and image reconstruction (Kemper et al., 2018). The applicability of stable diffusion models goes beyond the domain of image production. The use of these techniques has also been seen in several applications, including semantic map inpainting and materials design (Chen et al., 2023). According to Mak (2001), the use of generative AI models in visual communications has significant ramifications for the discipline of computer-assisted learning in art. According to Mak (2001), the integration of these models into the educational process enables users to acquire a more profound comprehension of aesthetics and enhance their creative abilities. The use of synthetic imagery may function as a means for investigating many aesthetic forms, conducting experiments with visual storytelling, and promoting innovation in the field of visual communication design.

One of the primary benefits of stable diffusion models is their capacity to produce synthetic pictures in situations when obtaining labeled information is limited or costly. In the domain of multispectral imaging (MSI), where the availability of labeled datasets is restricted, scholars have used synthetic MSI to initialize deep convolutional neural network (DCNN) frameworks for semantic segmentation (Kemper et al., 2018). According to Kemper et al. (2018), the use of synthetic MSI instead of genuine MSI resulted in reduced susceptibility to overfitting and established a cutting-edge benchmark for future research. Within the realm of current visual culture, diffusion models are a very effective instrument for the synthesis of images and the facilitation of creative expression. According to Saharia et al. (2022), these technologies facilitate the production of images with superior quality and provide a platform for the exploration of new creative avenues. Moreover, the applications of these technologies are beyond the scope of visual culture, making significant contributions to improvements in other scientific and research disciplines (Zhang et al., 2016). Within the domain of text-to-image production, generative AI models have shown their proficiency in producing visually authentic images by leveraging textual input (Mulkern et al., 2019).

The use of these models has shown to be a potent technique for facilitating the production of intricate visual representations, derived from textual descriptions. The technology exhibits a broad spectrum of applications, including various tasks such as inpainting, outpainting, text-to-image, and image-to-image translations. The adaptability of the model is derived from its

capacity to produce pictures in response to a wide range of stimuli, hence enabling a multitude of creative opportunities (Coccomini et al., 2023). The objective of these models is to produce artificial images that are imperceptible from authentic photographs, with potential applications in domains such as data augmentation, style transfer, and semantic modification (Coccomini et al., 2023). The proliferation of synthetic picture synthesis has yielded a multitude of advantages; yet, it has also engendered apprehensions over the veracity and reliability of visual material (Ferreira et al., 2021). According to a study conducted by Carlini et al. (2023), it has been shown that generative AI models possess the ability to recall certain images from their training dataset and then reproduce them during the generation phase. The generation of sensitive or copyrighted information by these models may give rise to privacy problems (Carlini et al., 2023).

The identification of images produced by generative AI models has emerged as a topic of scholarly inquiry, with research indicating the feasibility of using machine-learning methodologies for the detection of generated images (Coccomini et al., 2023). The comprehension of the viability of identifying artificially created images is of utmost importance in order to effectively tackle security and privacy issues in practical scenarios (Coccomini et al., 2023).

5. Exploring the Intersection of Human Creativity and Computational Creativity

“There is little that shapes the human experience as profoundly and pervasively as creativity. Creativity drives progress in every human endeavor, from the arts to the sciences, business, and technology (Paul & Kaufman, 2014).”. Human creativity and computational creativity are two interconnected areas of study that explore the generation of novel and valuable ideas, artifacts, and performances. Human creativity involves various cognitive processes, including divergent thinking and associative abilities (Benedek et al., 2012). Divergent thinking refers to the ability to generate multiple solutions or ideas to a given problem, while associative abilities involve fluency in retrieving and recombining remote associative elements.

These cognitive processes are essential for creative individuals to come up with original and innovative ideas (Benedek et al., 2012). Human creativity is poised to play a pivotal role in the upcoming intelligent era. It has been widely acknowledged that creativity, imagination, and innovation are fundamental resources inherent to humanity (Baer & Oldham, 2006). These invaluable assets are anticipated to serve as powerful tools in addressing and overcoming some of the most formidable challenges that lie ahead. By harnessing the power of creativity, individuals can unlock new perspectives, generate groundbreaking ideas, and devise innovative solutions (Baer & Oldham, 2006). The influence of AI raises questions about the development of creativity and independent thinking skills in an intelligent machine-dominated future society. While AI may not fully replicate human creativity, it can create art on some level, challenging the notion that creativity is solely a human quality (Myoo, 2022). Digital environments provide opportunities to scaffold and develop questioning skills, promoting imaginative thinking and deep understanding (Freestone & Mason, 2019).

On the other hand, computational creativity focuses on developing artificial systems that exhibit creative behavior or produce creative artifacts (Baer & Oldham, 2006). It involves the application of AI techniques to simulate or replicate human creativity computationally (Veale

et al., 2019). Computational creativity can be categorized into different types of creative systems, including:

- generative systems;
- systems that support human creativity;
- systems that collaborate with humans in a co-creative process (Rezwana & Maher, 2022).

In the field of computational creativity, researchers have explored different aspects of creativity in the context of computational systems. For this paper, we will explore some of the theories, practices, and evaluation methods that will contribute to our understanding of computational creativity as an interdisciplinary field.

a - The Lovelace Test and Unpredictable Creativity:

The Lovelace Test, inspired by Harold Cohen's notion of unpredictable human creativity, serves as a benchmark for evaluating AI systems. According to the test, an AI program is considered intelligent if it generates a routine that it was not initially engineered to create. This criterion highlights the unpredictable nature of human creativity and challenges AI systems to exhibit similar levels of ingenuity (Chamberlain et al., 2018).

b - Affective Computational Priming and Idea Generation:

Affective computational priming, a method for manipulating effects using digitally embedded stimuli, has been explored to understand its impact on idea generation with creativity support tools. Studies have shown that positive affective computational priming can enhance the quality of ideas generated, highlighting the potential of AI to influence creative performance through affective manipulation (Lewis et al., 2011).

c - AI and Creative Conceptual Design:

Computational creativity extends beyond generating artistic outputs and encompasses various forms of creativity, including combinational, exploratory, and transformational creativity. AI techniques have been successfully applied to computer art, demonstrating the potential for AI to contribute to creative endeavors (Boden, 2009). However, the question of whether computers can truly be creative remains a philosophical one, as creativity is deeply intertwined with human experience and understanding (Boden, 2009).

d - Evaluation of Computational Creativity:

The evaluation of computational creativity poses unique challenges. Researchers have proposed systematic evaluation methods to assess both human and machine creativity. These methods include assessing the impact of AI-generated creative outputs on the perceptual, cognitive, and affective states of the audience, as well as incorporating models of human perception and cognition into creative systems to enable self-reflective processes (Agres et al., 2016). The evaluation of AI-generated music, for example, has explored the influence of met or unmet expectations and the genre of music on evaluations (Hong et al., 2020).

e - Interaction Design in Human-AI Co-Creative Systems:

Human-AI co-creativity involves collaboration between humans and AI as partners in the creative process. Interaction dynamics, such as turn-taking, contribution type, and communication, play a crucial role in co-creative systems. The Co-Creative Framework for Interaction Design (COFI) provides a basis for modeling interaction in co-creative systems, enabling researchers to explore alternative design possibilities and categorize existing interaction models (Rezwana & Maher, 2022).

Computational creativity is a captivating field that explores the intersection of AI and human creativity. From the Lovelace Test, which evaluates AI's ability to create routines beyond its initial programming (Chamberlain et al., 2018), to affective computational priming that influences creative performance (Lewis et al., 2011) and from creative conceptual design to interaction design in co-creative systems (Agres et al., 2016), the above section highlights various facets of computational creativity. As AI continues to advance, further research and exploration in this field will deepen our understanding of its potential and limitations.

6. Conclusion:

In conclusion, this study examines the implications of generative AI on modern visual representations. The potential for generative AI models to change visual communications lies in their ability to open up novel possibilities for creativity. The exponential advancement of digital and technical innovation has given rise to generative AI applications, such as stable diffusion models. These tools can disrupt conventional creative processes by empowering users with new methods and resources for exploration. Generative AI technologies, present the capacity to fundamentally transform the creation and interaction with digital imagery. These technologies provide unique possibilities for the synthesis of images, the development of creative expression, and the advancement of artistic research. Nevertheless, it is essential to consider the veracity and reliability of visually generated material produced by AI. This study seeks to stimulate more research within the realm of visual communications, as scholars continue to investigate the significant consequences of the ongoing and constantly evolving intersection of artistic creativity and advances in technology in the contemporary digital age.

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