



# Convergence and Process Orientation in Algorithm and Generative Art

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**Abstract.** Material media and dematerialized virtual media (e.g., programs, systems, or Internet contexts) are synergistic in the transmission of information. In artistic practices of media, such art forms are ambiguous to develop multiple philosophies. The exploration of algorithms and generative art is revealing a new mode of thinking, shifting the artistic center of gravity towards the creative process rather than the result to open up a new strategy of practicing.

**Keywords:** Algorithm, Generative Art, Media Art

## 1 Introduction

Algorithmic art has a significant background of influences that is often ignored but that is evidencable as being established on the connection between mathematical structures and contemporary art. [1] Artificial intelligence is extraordinary good at calculation and following instructions. In general, discussions over the picture elements and the quantitative behaviors have a shared media phenomenon – digital coding – as a component of culture to realize a new set of cultural acquisitions. In Lev Manovich's perspective, it is a process of "reality→ media→ data→ database".[2] On the one hand, massive media arts are subject to a practical path of "reality→ media→ data". As an actual object is quantified, materiality and virtual programs, as media, interpret and transfer the object synergistically, thereby forming data information. Traditional media, in contrast, rely on software programs for the digitization of information. In the era of computers and Internet media, the world is reorganized with immaterial media (as data and algorithms), and the sampling or presentation process is realized with material media (e.g., sensor, computer or screen). As Theorist Adrian Mackenzle argues that digital media does nothing but code. "relations are assembled, dismantled, bundled and dispersed within and across contexts. " [3]

On the other hand, the data information transferred serves as the common language across media, and the surge of information endows the process where the common language signs converge into databases with more possibilities. In this case, it explains the process of "data→ database" in the cultural paradigm above. However, when the cultural paradigm is rendered artistic, data or databases become one of the elements of artistic creation and are subject to another round of "coding" in artistic

practices because of technological intentionality. In essence, such an editorial behavior is usually the usage of a symbolic language (data) of algorithms in limited space and with limited time. Between data and algorithms is a symbiotic relationship, neither active nor positive, for data can be obtained (or transferred) through sampling and quantification processes and immediately generated by algorithms. Thus, a paradigm can be: “data→ algorithms→ new data”, in which data serves both the subject and the object, and algorithms are endowed with generation, operation, execution and other behavioral intentions that contribute to the “emergence” culture based on a finite sequence. The artistic practice generated under such a pattern is called “algorithmic art”. Since any algorithm can only be visualized through material media (mainly computers), It will therefore be noted that there are commonalities between different art forms based on the computer as a material medium. Such as Systems Art and Synthetic Media constitute Generative Art. Other art terms with similar concepts include Fractal Art, Information Art, Software Art, Telepresence Art, and the list goes on and on. Artistic creation whose algorithms are subject to specific rules may aim to eliminate people’s intentional interventions as much as possible.

## 2 Algorithm and Generative Art Form by the Relation of Production

It is undeniable that different art forms tend to embrace each other’s elements in their developmental process due to cybernetics and informatics. While there are superficial differences between art forms that are based on specific media technologies, they share a similar underlying logical structure. The first, not only we define algorithm as a finite sequence of explicit instructions employed to solve specific problems using a computationa system, but also making our mind and culture by consistently applying a set of rules and procedures and passing this knowledge on to future generations. In a broad sense, algorithms can be thought of as people needed a descriptive scheme gained experiences into a systematic set of rules. The word “algorithm” comes from the name of the Persian In the case where the generative system of an art form is considered its artistic idea, Philip Galanter believes that such an art form is associated with natural law, physical machinery, computers, and other programs and systems. “Generative art is an art genre that reflects the process as a representation. It should be thought of as an action or gesture rather than a final product or as a process that initiates its own continued existence. ” [4] It can be seen that media technology has realized what Heidegger called “the way to see”,a mode of viewing and observing the world that shapes the acquisition of our cultural perceptions. When cultures and technologies are specified, it should be an “individual-media-art” relation of production because the artifacts are based on the ideologies and experience-oriented behaviors of the artists. In other words, Generative art is created by the artist who first creates the rules of art and forms the construction of the artwork through the autonomous generation of the program’s algorithms. “One of the main attractions of working with generative computational systems is their capacity for agency and autonomy. Systems that

can surprise and delight their authors in what they produce are undoubtedly an important motivation for working with computer generated creative systems. "[5]

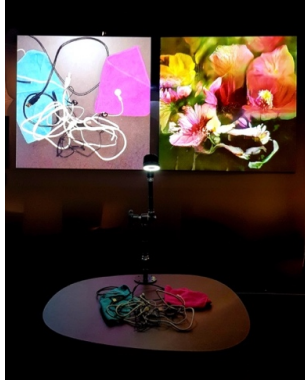
Michael Hansmeyer has used the algorithm generator to create aesthetic forms of building components. By changing the parameters in the program, he was able to create an infinite sequence of artistic results and discover the generative process. It is a new aesthetic form beyond the art. From his synthetic, organic art forms, we can realize that the determinacy of rules and algorithms and the unpredictability of results cannot be explained by teleology, and the latter is regarded in a narrow sense. Broadly, rules and algorithms are immaterial media. They exclude people's intentionality but are dominant in technological intentionality, maintaining an alterity relation between "people" and "the world". The visualization forms or patterns are naturally predictable, but the figurative forms cannot be controlled. Nonetheless, the generation of forms is the first step of visualization in artistic works. Michael's generative artifacts use the visual elements generated to transfer fictitious, immaterial elements in digital form into physical entities through material media and materials, and realize fictitious experiences with immersive space made of these entities. For instance, in early 2010, *Subdivided Columns* (2010-2017) used laser-cut sheets to make the hierarchical model, and *Astana Columns* in 2017, the technique was replaced by a high-speed digital cutting and creasing machine. *Digital Grotesque* (2013-2017) applied 3D printing(3DP) to realize the sandstone structure to accomplish the physical space experience. Thus, the classification of media arts based on the specific material media involved is outdated. Now, art that takes algorithm or generation as the creative logic is becoming an art form dominated by the relation of production, and the technology and material options that are crucial to the final entities are existing media themselves.

### **3     Autonomy in AI Art: Artistic Expression Turns to Process**

Secondly, the essence of autonomous systems is automatic control. Manovich considers it as one of the rules of new media and makes a deliberate distinction. Low-level automation is applied in massive independent software programs as a simple function module. Generative art is regarded as high-level automation for it concerns the semantics of the contents generated. At the same time, samples of media arts include artificial intelligence (AI), real-time generative interaction, virtual real-time feedback, and other cutting-edge techniques related to media. Does the automaticity of AI in artistic practices make it an "artist" who is capable of independent creation? *Learning to See* ( Fig. 1), an interactive installation of Memo Akten, had a reflection on this question from the artistic dimension. When a real-time camera takes a picture of an everyday object, the artistic image that is interpreted by the neural network can be shown on the screen in real time. Audiences are allowed to touch or move the object and are provided with a subtle visual experience by interacting with it. AI algorithms' deep learning that simulates the neural network of the human brain is a practice with high-level automation. The roots of the use of deep learning in the arts lie in image

style transfer which refers to the problem of trying to recolor an image so that it looks as though it was done in the style of a well-known painter.[6] In the Learning to See series, the concept of "seeing" is captured by AI to form interoperability with human perceptual experience. As such, Memo Akten chose to use the visual appearance filtered and edited by AI to reflect on the cognitive bias of the human mind. Undoubtedly, everything we see, hear, or feel is influenced by our intentionality. In fact, media technologies are reshaping humanity and the world with their technological intentionality. According to Langdon Winner, with respect to the autonomy of these media with high-level automation media, focusing on how an artistic work expresses its ideas may be one of the ways to perceive the territories involved. " Standard to such treatments has been a mode of symbolism that portrays technological artifice as something literally alive. Through some strange process a man-made creature, machine, or advanced system takes on lifelike properties-consciousness, will, and spontaneous motion-which place it in rebellion against the human community. " [7].

Apparently, Winner considers the symbolic approach an artistic expression of the high-level automation of media technologies. By quoting the term, autonomous technology, he refers to all thoughts and comments that imply humans have lost their control of technology. Autonomy, in contrast to automation, has a brighter essence of self-government between freedom and control. However, automation includes self-governing independent generation (high-level) and mechanical tools designed to replace human labor or simplify manual programs (low-level). As the milestone in the history of self-governing AI art, *Memories of Passersby I* (see Fig. 2) by Mario Klingemann is an artistic expression with the code and the algorithmic system as its core. It uses the neural network to generate real-time human portraits. As for his artistic conception, Mario explains that the AI algorithm will generate portraits of people who do not exist forever. By learning the painting styles of European masters, AI starts a feedback loop between creation and disappearance. The two screens are for female and male portraits, respectively. The vintage look of the media system (computer hardware included) has an almost Orwellian appeal. It is undeniable that the smart furniture entities are actually Mario's personal reminiscent mood, but the mood is harmonized with the AI-generated history paintings and symbolizes the intentionality of "an immersive relationship" as AI penetrates into the living environment. As for his identity as an AI artist, many of these are focused on the relationship between art-maker, artwork, and audience. The introduction of AI into this space adds a layer of complexity. [8]Mario Klingemann does not care. For him AI is just one tool in a long history of tools that was bound to be used for artistic purposes. AI as a tool isn't called a 'collaborator'.



**Fig. 1.** Learning to See by Memo Akten,2019.



**Fig. 2.** Memories of Passersby I by Mario Klingemann,2018.

In fact, the creation system for algorithm and generative art is revealing a new mode of thinking about art. The focus of artistic creation has shifted from an emphasis on the final presentation of the work to a process of change as its primary purpose. It enhances the audience's experience of the process, and at the same time opens up a whole new artistic strategy. However, there comes an implicit limitation in this limited artistic exploration that seems to evade the intervention of human consciousness. The supportive algorithm evolution and generation can only be realized with a higher level of collaboration of multiple immaterial media, including open-source software, data sets, and modeling programs. Image processing enabled by machine learning has high accuracy, but training can take a long time when data collection and labeling is included in the process.[9] As a result, the majority of process-centered artistic practices remain taking virtualization and dematerialized visualization as the final artistic outcome, and few artistic explorations concerning the perceptual experience of material media consider algorithm and generative art as supportive creative media instead of the artistic subjects themselves. When an artistic expression has no dominant inten-

tionality of immaterial media (algorithms or programs), the technological intentionality of various media involved is too ambiguous to decide which media should be dominant.

## 4 Conclusion

Since the twentieth century, the relationship between material media and the computer is no longer noninteractive and independent. The computer has become a media processor (or synthesizer or manipulator) instead of a tool for mere computational purposes or a manipulation/communications media. In other words, in the era of converged media, traditional media remains part of the media composite and constitutes a sophisticated, inclusive cultural law with new media -- the interpretation of digital codes.

Obviously, digital decontextualization is homogenizing the world, so that all things on earth start to converge. In this context, it is mapping and interacting with the world, attempting to construct a virtual world – Metaverse. Of course, Metaverse is at present a promising integration of multiple hybrid technologies, including extended reality, digital twin, and blockchain. The essence is digitalization. Similarly, the artistic visualization of traditional media de-structures and reshapes information, and converged media's unique information acquisition, access, and processing reflect the behavioral logic of the ecology of electronic media. For all the reflections on media and artistic works, whether they focus on the content or the format, or the "creative" or the "found" artistic strategy, it is always about technological intentionality. So far, technical intentionality has assimilated both the external and internal interpretations in digital codes, and the evolution of data-information portfolios in converged media also provides infinite creative possibilities.

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