

Algorithmic Art: The Formation of the Genre and Its Perception in Contemporary Society.

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Abstract

Algorithmic art is a form of creativity in which the pattern is generated according to a predetermined sequence of mathematical instructions (an algorithm). The aim of this study is to analyze the nature and history of algorithmic art, as well as to examine how this phenomenon is perceived by contemporary audiences. A comprehensive approach was applied in this work: a literature review on the history and theories of algorithmic art was conducted, along with an empirical study — a survey of 65 participants aged 11 to 70. The methodology included a descriptive analysis of sources and a quantitative study of public opinion using statistical processing. The results show that algorithmic art bridges science and creativity, highlighting the role of process and randomness in image generation. Most respondents from older age groups (over 30) recognized algorithmic art as an independent genre, while opinions among younger participants were more divided. The findings confirm that algorithmic art lies at the intersection of culture and technology: although it is actively developing and gaining popularity, public opinion about it remains ambiguous, partly due to questions of authorship and artistic value.

Introduction

The digital age has introduced new forms and approaches to art. One such direction is algorithmic art, based on the programmed generation of visual or audio imagery. In contemporary art studies, algorithmic art is viewed as a type of procedural or generative art, in which "the design is defined by an algorithm." Its origins are linked to mathematical traditions, including Islamic geometric patterns and Renaissance perspective, where "the foundation lies in the algorithmic repetition of a given structure." With the rise of computational power in the 20th century, such concepts found their digital embodiment. The pioneers of computer art in the 1960s–70s — G. Nies, F. Nake, A. Noll, M. Moor, V. Molnár — were the first to create works using computer-controlled plotters (Galanter, 2003; Hertzmann, 2018). In the 1990s, the term "algorist" was introduced by J.-P. Hébert when forming the group of artist-algorists (DAM, n.d.; Verostko, n.d.).

The aim of this study is to define the concept of algorithmic art, identify its key characteristics, and explore how it is perceived by the public. The relevance of this topic is driven by the rapid spread of generative technologies (including artificial intelligence) in creative practice, sparking debates about the boundaries of art and the role of the artist. The main questions are whether algorithmic art is considered an independent artistic practice, and how people of different ages understand the phenomenon of computer-generated creativity. It is assumed that perception depends on cultural context and age — similar to studies on attitudes toward AI art, where younger people are more likely to accept algorithmically generated images as art compared to older generations.

Literature Review

In international academic discourse, algorithmic art is commonly defined as "art in which the design is generated by an algorithm." A comparable definition is provided by the Russian-language Wikipedia: "algorithmic art is a form of art based on the algorithmic repetition of a given structure." Crucially, this emphasizes that the artist does not create the image directly

but instead formulates the rules — the algorithm — that subsequently produces the artwork. This practice frequently incorporates randomization techniques, employing pseudo-random numbers to introduce variability (Hertzmann, 2018). Such an approach underscores one of the defining characteristics of generative art: the element of unpredictability. Consequently, while the artist specifies the input parameters, they relinquish full control over the final outcome. From a historical perspective, algorithmic art has developed in parallel with the evolution of computer art. During the 1960s and 1970s, mathematician-artists such as Georg Nees, Frieder Nake, Vera Molnár, and A. Michael Noll programmed computer plotters to generate abstract graphic compositions. In 1970, Sonia Landy Sheridan established the "Generative Systems" program at the School of the Art Institute of Chicago, marking a seminal milestone in the theoretical discourse on digital art. By the late 20th century, artistic works incorporating fractals and genetic algorithms began to emerge; for instance, the fractal art of the 1980s and 1990s was produced through iterative processes based on mathematical formulas. Contemporary developments in the field encompass not only painting but also interactive and kinetic installations, frequently employing neural networks for tasks such as text-to-image generation. The Algorists collective played a pivotal role in the institutionalization of algorithmic art. According to documented sources, the group was co-founded in 1995 by Jean-Pierre Hébert and Roman Verostko. The Algorists collective, co-founded by Jean-Pierre Hébert and Roman Verostko, is credited with articulating an algorithmic framework for defining art (Verostko, n.d.; DAM, n.d.). Members of the group, along with their successors, adapted traditional tools such as Eastern brushes to computer-controlled plotters and developed interactive drawing-generation systems. Scholars have established parallels between algorithmic art and historical artistic practices, such as Islamic patterns and Renaissance perspective (Verostko, n.d.). Contemporary scholarship highlights the inherently interdisciplinary nature of algorithmic art, positioning it at the confluence of art, mathematics, and technology. For instance, academic definitions frequently describe the algorithm as a "detailed recipe" for artistic creation. In contemporary design practice, techniques such as loops, recursion, random number generation, and model-based approaches (including fractals and cellular automata) are employed to construct complex compositional structures. Scholars concurrently emphasize that algorithmic art transcends the notion of mere "computer-generated painting"; rather, it constitutes a process in which software functions as a conceptual metaphor for creative agency. Despite a substantial body of literature concerning its historical evolution and methodological frameworks, the field continues to experience a relative paucity of empirical research, particularly in relation to audience reception and the criteria by which such works are accepted as "authentic art." Although recent scholarship on digital art has increasingly identified algorithmic creativity as a salient topic within contemporary discourse, systematic surveys and psychological analyses remain limited. Multiple sources observe that technological innovations in art typically undergo distinct phases of public response: initial fascination, subsequent skepticism, and eventual normalization. This trajectory provides the impetus for the present study, which seeks to address existing gaps by examining public attitudes across different demographic groups toward algorithmic art and articulating findings that are pertinent to current debates in the art world.

Methodology

In this study, the sample consisted of 65 respondents ranging in age from 11 to 70, encompassing a broad age spectrum with a multigenerational composition, including adolescents, young adults, and mature participants. This approach enabled the identification of age-related differences in the perception of algorithmic art. Participants were recruited through convenience sampling; respondents were volunteers from an urban community and were not restricted by profession or educational background. This ensured the representativeness of opinions and allowed for the capture of a diverse range of perspectives on the issue under investigation.

The primary instrument for data collection was a questionnaire designed in alignment with the study's objectives. The survey included both closed-ended questions, aimed at gathering structured quantitative data (for example, whether respondents consider algorithmic art an independent genre, or whether they perceive the author of such works as a human or a machine), and open-ended questions, which allowed for a deeper exploration of respondents' motivations and reasoning. Thus, the survey addressed key aspects of the topic: perceptions of the genre, issues of authorship, and subjective evaluations of the artistic value of algorithmically generated works.

The choice of questionnaire-based survey as the principal research method was driven by its capacity to efficiently collect data on individuals' subjective attitudes toward a novel cultural phenomenon. The quantitative items provided structured information on the distribution of opinions, while the open-ended responses offered qualitative context that enriched the understanding of the phenomenon under study. The combination of these quantitative and qualitative approaches was deemed most appropriate given the interdisciplinary nature of the topic, which requires both an analysis of existing theoretical frameworks and an examination of the current "social demand."

For data analysis, descriptive statistical methods were applied, alongside content analysis of the open-ended responses. The qualitative data were systematized according to major themes, such as conceptions of authorship and distinctive features of algorithmic art. Quantitative responses were processed to calculate percentage distributions for each parameter. Special attention was given to comparative analysis across age groups: respondents' answers were categorized into cohorts "under 30" and "over 30," which facilitated the identification of generational shifts in perceptions of the genre in question. This approach aligns with generative research methodologies in the fields of culture and art, allowing the empirical findings to be correlated with theoretical propositions from existing literature and to assess the extent of their convergence or divergence.

What Is Algorithmic Art?

Algorithmic art is a branch of art in which primary emphasis is placed on the use of mathematical algorithms to create works. Unlike traditional drawing methods, where the artist manually produces the image, in algorithmic art the artist develops an algorithm that generates or transforms images through computational processes.

Algorithmic art possesses a set of unique features that distinguish it from other forms of creative expression.

One of its key characteristics lies in the fact that the process of creating the work often becomes more significant than the final result. Rather than directly crafting the piece as in traditional art,

the artist formulates rules, algorithms, or programs that then autonomously generate the final product. This shifts the focus from the finished artwork to the system itself—its structure and the logic of its operation.

Another important trait of algorithmic art is its use of randomness. Many works incorporate elements of randomization, allowing for unique outcomes each time the algorithm is executed. This imbues the works with dynamism and unpredictability, highlighting the role of chance as a creative factor. Even when the algorithm is fixed, the result frequently escapes the artist's full control, adding layers of depth and meaning.

Technology serves as the foundational pillar of algorithmic art. Computers, programming, mathematical models, and modern technologies such as artificial intelligence are not merely tools but integral components of the creative process. The artist must master these technologies to design the algorithms that ultimately form the core of the artwork. Thus, algorithmic art stands at the intersection of science, technology, and creativity, offering new avenues for self-expression and exploration of the world.

History

Algorithmic art emerged as an independent genre in the mid-20th century, when computer technologies and mathematical algorithms began to be actively applied in artistic practice. Unlike traditional forms of art, where the artist directly manipulates materials, algorithmic art relies on the development of algorithms—step-by-step instructions by which machines generate images or objects. This approach opened new possibilities for artists, expanded the boundaries of creativity, and gave rise to a new type of artistic thinking in which the central role is played not by the physical gesture but by the system of rules governing the creative process.

A key milestone in the formation of algorithmic art was the use of early electronic computing machines and graphic plotters in the 1960s. It was during this period that German mathematicians and artists Georg Nees and Frieder Nake, as well as Hungarian-French artist Vera Molnar, conducted their first experiments with computer graphics. Their works became the world's first artistic creations generated by algorithms using computers. These pioneers laid the foundations of the genre, demonstrating that algorithms could function not merely as technical tools but as mediums of artistic expression.

In the following decades, algorithmic art evolved rapidly. In the 1970s, British artist Harold Cohen developed the AARON system, one of the first programs capable of autonomously generating artistic images (Hertzmann, 2018). Cohen's system evolved from producing abstract drawings to creating more complex compositions that combined figurative elements with randomness, thereby bringing machine-generated art closer to the realm of creative self-expression. This innovative achievement not only anticipated the rise of artificial intelligence in art but also challenged conventional notions of authorship and creative control.

In the 1980s, significant contributions to the field were made by artists such as Roman Verostko and Jean-Pierre Hébert. Verostko, who began his career as a painter, turned to algorithmic methods in the late 1970s and early 1980s. His distinctive approach involved developing programs that mimicked traditional drawing techniques such as engraving and calligraphy. Using plotters and specially designed ink pens, Verostko produced intricate drawings that merged the mathematical rigor of algorithms with the organic qualities of the hand-drawn line (Verostko, n.d.). Jean-Pierre Hébert, who began experimenting with algorithmic drawing in the 1970s, fully embraced the genre in the mid-1980s. Utilizing personal computers and graphic

devices, he created conceptual works in which the algorithm formed the core of the artistic intent. In 1995, Hébert and Verostko co-founded the "Algorists" group, uniting artists who wrote their own algorithms and used them as their primary creative method.

Although algorithmic art as a digital practice only emerged with the advent of computers, its conceptual roots extend to much older traditions. As early as antiquity, artists employed mathematical and geometric principles to craft harmonious forms. Ancient Greek architects, for example, applied the golden ratio and strict proportions in temple construction to achieve visual harmony and symmetry. In the Middle Ages and especially during the Renaissance, artists once again turned to mathematics as a tool for artistic order: Leonardo da Vinci, for instance, systematically developed principles of perspective, symmetry, and proportion—foretelling future algorithmic approaches. However, it was only with the invention of computing machines in the 20th century that the digital realization of these ideas became possible—automatic, repeatable, and scalable to new levels of complexity.

Thus, while mathematical logic and algorithmic thinking have been intrinsic to art since ancient times, it is the development of computer technologies that allowed algorithmic art to crystallize as an independent discipline, merging mathematics, technology, and creativity. Today, this genre continues to evolve, opening new horizons for artists at the intersection of science and visual art.

How is algorithmic art created?

Algorithmic art is a unique form of artistic expression based on the use of algorithms—sequences of clearly defined instructions that govern the creation process. This process combines the artist's creativity with the computational power of a computer, producing complex visual or auditory results.

At the initial stage, the artist forms the concept of the future work and defines the algorithmic basis for its realization. This includes selecting a mathematical model. The foundation may be geometry, chaos theory, probabilistic methods, or linear algebra. For example, fractal art is based on iterative formulas such as: $z = z^2 + c$, where z is a complex number representing a point on the plane, and c is a parameter that shapes the fractal. Algorithms may use transformations like rotation, scaling, and reflection to create symmetrical patterns or abstract forms. The use of randomness adds uniqueness: random number generators can determine the color, shape, or position of elements. An example concept: creating a mosaic from geometric shapes where the size and color of elements are set randomly, but the placement follows specific symmetry rules.

After developing the concept, the artist implements the algorithm in code. This requires choosing a programming language or specialized software. Among popular tools are:

Processing: an easy-to-learn tool with concise syntax for visual projects.

Python: supports libraries like NumPy, Matplotlib, and PIL for graphics processing.

JavaScript (p5.js): ideal for web-based interactive projects.

Key methods include using loops and recursion for repeated elements like fractals, generating random numbers to add variability, and working with colors—where palettes can be static or dynamically generated based on rules.

Once the algorithm is completed, it is executed to generate a visual or auditory result. This stage combines predictability with randomness. Algorithms can generate both strictly defined forms and include randomness to create unique outcomes. Results may be presented in:



Digital form (images, videos, animations stored digitally)

Physical form (prints, interactive installations, or laser-cut works)

For example, artist Tyler Hobbs uses algorithms to create complex abstract forms later transferred to canvas through printing.

This stage also involves refining the algorithm and experimenting with parameters. An iterative approach allows the artist to fine-tune:

Color palette: changing hues, saturation, or contrast

Scale and detail: increasing or decreasing iterations

Speed and dynamics: if it's an animation or interactive piece

The artist may run the algorithm multiple times, analyze results, and adjust until achieving the desired outcome.

Examples of technologies and approaches include:

Fractal art: based on iterative formulas for self-similar structures

Generative art: uses randomness to create dynamic, ever-changing works

Artificial intelligence: using neural networks (like GANs) to generate images that mimic artistic styles

The process of creating algorithmic art is a synthesis of mathematical knowledge, programming skills, and artistic vision. At every stage, the artist makes decisions that define how the algorithm transforms abstract rules into unique works. This iterative process not only explores new aesthetic possibilities but also reveals unexpected results, making each piece truly one-of-a-kind.

Types of Algorithms in Art

Recursive Algorithms (Fractal Structures)

Recursive algorithms repeatedly apply the same procedure to the results obtained. A classic example is fractal algorithms that create self-similar structures repeating at different scales. Fractal art is created by computing fractal sets and displaying the results as images. These algorithms generate highly intricate patterns with infinite detail: each zoom reveals a similar structure, giving the work a distinctive "mathematical" aesthetic. In artistic practice, this is used to generate abstract visualizations and installations, such as visualizations of the Mandelbrot set or fractal landscapes.

Stochastic Algorithms (Using Randomness)

Stochastic algorithms introduce an element of randomness into the generation process. Using pseudo-random numbers or noise functions (like Perlin noise), they create organic, chaotic patterns and textures. As a result, each code execution can yield a unique variant: the composition gains unpredictability and diversity, bringing it closer to natural phenomena. Artists use this method to create dynamic and variable images—e.g., works based on fractal noise or random element distribution. Randomness balances order and chaos, enriching the aesthetic expressiveness of the piece.

Evolutionary Algorithms (Genetic)

Evolutionary algorithms mimic natural selection processes. First, a population of "samples" (images) is created, and then new generations are formed through mutations and crossovers of

the fittest specimens according to a given fitness function. Over iterations, the algorithm "selects" and refines visual forms, evolving images towards optimized aesthetics. In art projects, such algorithms are used, for example, in generating abstract compositions or interactive installations (like the network project Electric Sheep), where the most "successful" images are preserved and further evolved. This approach gives the work the character of biological evolution and an intriguing unpredictable dynamic.

Cellular Automata

Cellular automata are discrete systems consisting of a grid of cells that change state at each step according to simple local rules. The most famous example is Conway's Game of Life: each cell in a 2D grid dies or revives depending on the number of living neighbors. Despite the simplicity of rules, such automata can produce complex emergent patterns. In art, this opens possibilities for modeling self-organizing processes: small changes in initial conditions or rules lead to rich visual patterns. For example, artist Alexander Reben in his Puritan Communion project modifies Life rules using color palette changes upon birth and death of cells, resulting in shimmering organic compositions.

Machine Learning Algorithms (GANs and Neural Networks)

Modern generative methods often rely on machine learning algorithms. Deep neural networks, including GANs (Generative Adversarial Networks), are trained on large image datasets and can produce new artworks that retain stylistic features of the training set. For example, GANs can generate photorealistic landscapes or faces and replicate artistic styles of famous masters (Portrait of Edmond de Belamy was the first GAN-based piece auctioned). Style transfer using CNNs (Convolutional Neural Networks) is also popular to overlay artistic styles on photographs. Such algorithms create hybrid visual effects: they can imitate traditional techniques or produce unprecedented combinations of forms and textures.

Conclusions and Key Points:

Different algorithmic approaches form distinct features of visual language:

Recursive (fractal) algorithms create compositions with multi-scale self-similar structures.

Stochastic algorithms (with randomness) add organic irregularity and texture variety, balancing order and chaos.

Evolutionary (genetic) algorithms "select" and evolve visual forms through multi-generational refinement by criteria.

Cellular automata show complex emergent patterns arising from simple repeated rules.

Neural network methods (GANs, CNNs) generate new styles and photorealistic images, often mimicking or combining existing artistic techniques.

The diversity of algorithmic methods expands the expressive possibilities for artists and enriches the visual language of contemporary art.

Art or Technology?

Art is a multifaceted and subjective phenomenon that can be seen as a form of human expression that creates aesthetic perception, as well as a tool for conveying ideas, emotions, and philosophical concepts. The majority's opinion on the nature of art may vary depending on

cultural and personal preferences. It can serve as a means of conveying meaning, experience, or commentary on the surrounding environment.

For a long time, the creation of paintings was considered not art but craftsmanship, as it was seen as a form of manual labor requiring technical skills rather than a creative and intellectual process. In ancient Greece and Rome, artists were more like craftsmen fulfilling commissions than recognized creators. In their understanding, art was associated with philosophy and ideas, not the technique of execution. During the Middle Ages, despite the significant role of artists in religious and cultural projects, drawing continued to be viewed as part of craftsmanship. With the development of the Renaissance in the 15th-16th centuries, there was a shift: artists began to see themselves not only as masters but also as creators, capable of conveying ideas and emotions. During this period, the concepts of art as an intellectual and philosophical activity, rather than merely a craft, began to develop. Italian masters such as Leonardo da Vinci, Michelangelo, and Raphael contributed to changing the attitude toward drawing, associating it with a scientific approach and philosophy, allowing art to become a separate field, recognized not only for its technical mastery but also for its ability to convey ideas, emotions, and the artist's views. Drawing began to be perceived as a creative process requiring not only craftsmanship but also intellectual effort, inspiration, and philosophical depth. Drawing was seen as art only from the end of the Renaissance, when it ceased to be purely manual labor and began to be viewed as a complex intellectual and creative process.

In addition, in the past, art was primarily seen as something that possessed aesthetic appeal and harmony, with the main criterion for evaluating works being their visual beauty. The classical tradition of art focused on idealized forms, symmetry, and technical perfection, believing that true art should evoke a sense of admiration through its aesthetic value.

Art ceased to be exclusively an aesthetic object aimed only at visual appeal starting in the late 19th and early 20th centuries, when a significant shift in the perception of artistic creativity occurred in the cultural and artistic environment. This process was driven by the development of modernist movements that rejected traditional canons of beauty and harmony, placing the idea and context of a work at the center of attention, rather than its external attractiveness. The first significant stage of this transformation was the Impressionist movement, which, although still seeking new ways to depict the world, departed from classical idealization. Artists such as Claude Monet and Pierre-Auguste Renoir focused not on the accuracy and details of the depiction, but on conveying the immediate impressions of light and color, thus emphasizing the subjectivity of perception of the surrounding environment.

However, the main turning point came with the emergence of avant-garde movements in early 20th-century art. With the development of Cubism, Futurism, Dadaism, and Surrealism, artists began to move away from the notion of beauty as the main criterion for art and started to perceive it as a means capable of expressing abstract ideas and philosophical concepts. In this context, the works of masters such as Pablo Picasso, Georges Braque, Marcel Duchamp, and Salvador Dalí gained significance not only as visual objects but also as discursive elements requiring active reflection and interpretation from the viewer. The process of creating a work became seen as a way of interacting with reality, not just reproducing visual images. Special attention should be paid to the Dadaists and Conceptualists, who introduced the concept of art as a carrier of ideas, not physical form. Marcel Duchamp, whose "Fountain" became one of the most famous examples of this movement, demonstrated that the process of choosing an object and its context could be more important than traditional craftsmanship and aesthetic value.

Within conceptual art, the work was defined not by its visual essence but by the idea behind it.

This approach radically changed the perception of art, allowing it to be seen not only as a result of individual expression but also as a means for critical reflection, discussion, and even provocation.

With the development of modernism and the avant-garde, art lost its former commitment to aesthetic harmony and beauty, replacing it with a focus on idea, context, and concept. This transformation led to the perception of art as a multifaceted discourse, in which not only the visual effect but also the depth of its conceptual and philosophical content hidden behind the work became important.

Algorithmic art is a field where the creation of works is based on mathematical calculations and programming. Unlike traditional art, where the artist physically interacts with the material, algorithmic art involves processes in which the person, creating an algorithm or a program code, sets the rules, and the result can be automatically generated without direct involvement. This means that the artist may not intervene in the execution process of the work, and the process and final result depend on the code and computations. To create algorithmic art, the artist writes a program or script that determines which elements will be used, how they will interact, and which mathematical or random processes will influence the final result. This can include the creation of images, animations, sculptures, or even sound works. It is important to note that the algorithm can be either fixed or adaptive, generating unique works every time it is run.

A simple example of algorithmic art is the use of fractals.

Fractals are geometric shapes that can be created using mathematical formulas, and they possess the property of self-similarity. An artist can write a program that generates fractal images, exploring infinite geometric structures created through repetitive mathematical operations. These images often contain complex but symmetrical patterns that cannot be created manually with the same level of precision and complexity.

Another example is generative art, where software algorithms create images or sounds based on random processes or given mathematical principles. Such works can be produced in real time, where each launch or change of the program leads to the creation of a unique work. Here, it is important that the artist does not control every detail—he only sets the initial conditions or constraints, but the process of generating the work depends entirely on the algorithm.

It should be noted that the creation of algorithmic art can be divided into several stages. At the first stage, the artist develops the idea, determines what type of data and processes he will use, and writes the algorithm. Then the works are generated using the computer. Unlike traditional art, where the artist directly interacts with the material and shapes the composition during the creation process, algorithmic art requires the artist to have primarily programming skills and an understanding of the mathematical principles underlying the work.

As mentioned earlier, in the second half of the 20th century, a work of art became valuable not because of its aesthetic appeal but because of the meaning and concept underlying it. Joseph Kosuth, one of the founders of the conceptual movement, argued that the essence of art lies in its idea, not its material embodiment. This shift had a huge impact on many movements, including algorithmic art.

The division between traditional hand-created art and algorithmic art can be understood through several key aspects.

Firstly, the process of creation. In traditional art, the artist directly interacts with the materials—brushes, paints, clay. It is manual labor, reflecting the individuality of the master. Each line and stroke carries his personal mark. In algorithmic art, the focus shifts from physical labor to programming. The artist writes code that becomes the work itself. The result is often

unexpected even for the author, as algorithms, especially when using elements of randomness, can generate complex and unique structures.

Secondly, the role of technology. Traditional art is minimally dependent on technological innovations. Even in complex techniques such as stained glass or lithography, craftsmanship plays a key role. Algorithmic art fully relies on technology. Computers, software, and artificial intelligence become not just tools, but active participants in the process. This expands the artist's capabilities, allowing them to create works that would be impossible to implement manually.

Thirdly, the perception of aesthetics. In traditional art, aesthetic value is often determined by visual appeal and technical skill. In algorithmic art, aesthetics may be secondary to the concept. Many works of this direction are abstract or even not intended for visual perception. The focus is on the idea embedded in the algorithm. For example, a work may be a form of mathematical experiment or a reflection of complex systems such as the interaction of nature and technology. This shift in art—from form to meaning—was also reflected in the algorithmic approach.

The Market of Algorithmic Art

Algorithmic art in the modern art market:

Algorithmic art has gradually been gaining a more prominent place in the contemporary art scene. Since the early 2000s, algorithmic art has been part of major exhibitions such as *Ars Electronica* and *Transmediale* (*Ars Electronica*, n.d.; *Transmediale*, n.d.). In recent years, large galleries and auction houses, including Christie's and Sotheby's, have actively exhibited and sold works created with algorithms and artificial intelligence. In 2018, Christie's sold the algorithmic painting "Edmond de Belamy," created using a Generative Adversarial Network (GAN), which marked a significant moment for the recognition of this direction in the art market (*Christie's*, n.d.).

Critics view algorithmic art with interest but also some skepticism. Some see it as a continuation of the conceptual art tradition, while others consider it a new phase in the digital artistic process, where authorial control gives way to computational processes. Especially relevant are debates about whether algorithmic art is an independent artistic act or merely a tool for the artist.

From the perspective of museum exhibitions, algorithmic art is increasingly finding a place in major institutions such as the Centre Pompidou (Paris), the Museum of Modern Art (MoMA) (New York), and the British Museum. However, its integration into traditional gallery spaces is slower, as special technical conditions are required to display dynamic and interactive works.

Application of Algorithmic Art in Digital Media and Interactive Installations:

Algorithmic art finds wide application in digital media. It is used in generative graphics, video projections, interactive websites, and audiovisual performances. Artists often use environments like Processing, Python, P5.js, and OpenFrameworks for algorithmic creation (*Processing Foundation*, n.d.; *Python Software Foundation*, n.d.).

In interactive installations, algorithmic art becomes especially expressive. Visitors can interact with the work in real time: changing its shape, color, structure through movement, voice, or even neuro-sensory signals. Examples of such projects can be seen at the Mutek festival (Canada) or in the teamLab Borderless space (Tokyo), where digital works respond to the movements of the viewers.

Comparison with Other Contemporary Art Movements:

Algorithmic art often overlaps with digital art and media art, but it has several distinct characteristics. Unlike classic digital art, which may include digitized paintings or 3D modeling, algorithmic art involves the use of mathematical models and code to generate images, sounds, or even physical objects.

Like media art, algorithmic art uses technology to create works, but media art focuses on integrating new media (video, sound, virtual and augmented reality), while algorithmic art is centered around the exploration of automated creative processes and generative systems. Algorithmic art is also closely related to generative design and artificial intelligence in art, expanding the boundaries of artistic self-expression. Therefore, it is not just a part of the digital art scene but a standalone direction with its own aesthetics, philosophy, and technical arsenal.

Aesthetic and Philosophical Aspects of Algorithmic Art

Algorithmic art represents a unique form of creativity where the primary focus is on the use of algorithms and computer codes to create works of art. Like traditional forms of art, it has its own aesthetic value and the ability to evoke emotions and provoke thought in viewers. However, the question of whether algorithmic art can be considered art in the traditional sense remains a subject of debate, as it is based on the use of technology and mathematical principles, which fundamentally distinguishes it from manually created art.

It was previously discussed that traditional art is valued for the mastery of the artist, their ability to convey ideas, emotions, and philosophical thoughts through physical interaction with materials, whether it's canvas, clay, or stone. In the classical sense, an artwork is the result of human labor, the individuality of the master, and their personal creative contribution. In this context, creativity and authorship are considered inseparable aspects of art, and most works of art are evaluated from these perspectives. Algorithmic art, on the other hand, calls these traditional ideas into question, as its creation process involves interaction with algorithms, which can generate unique works without the artist's direct intervention.

Algorithmic art places more emphasis on the idea embedded in the algorithm than on the physical execution of the work. The artist in this context is not a master who directly forms the artwork, but rather an engineer who creates a system of rules and a framework for future creation, based on which the computer generates artistic images. This opens new horizons for creating art, as algorithms can produce forms and structures that would be impossible for humans to achieve manually, such as complex fractals or dynamic animations.

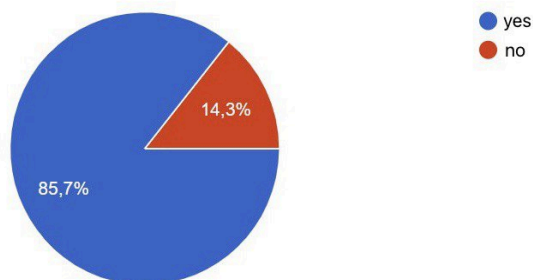
However, for some viewers, this may be difficult to perceive, as a machine-generated work of art might seem less "human" and devoid of traditional signs of individuality.

Nevertheless, algorithmic art can be regarded as art in the traditional sense if we understand art not just as the result of physical labor but also as a process of expressing ideas. The importance of the concept, idea, and context of an artwork was emphasized in conceptual art, where the focus was not so much on the form and appearance but on the thoughts and philosophical questions embedded in the work. Algorithmic art continues the tradition of conceptualism, where the idea behind the work is more important than its physical execution (Kosuth, as cited in Galanter, 2003). This makes algorithmic art appealing to the modern viewer, who values the conceptual and intellectual aspects of art, rather than just its aesthetic value.

As for perception, viewers experience algorithmic art differently, largely depending on their knowledge of technology and art. For some, it may be complex and incomprehensible, as it requires certain preparation and the ability to perceive the artwork as the result of human-machine interaction. For others, algorithmic art represents a new and exciting direction, opening up boundless possibilities for creativity. It is important to note that appreciating algorithmic art requires not only an emotional response but also intellectual involvement, as algorithmic art also incorporates technological aspects. The viewer needs to understand how these technologies work to fully appreciate the intent behind the piece.

Algorithmic art raises an important question about the nature of authorship. In traditional art, the artist is perceived as the creator of the work, whose creativity reflects their individuality, feelings, and thoughts. In algorithmic art, authorship becomes more blurred, as the work is created not directly by the artist but through an algorithm that can be programmed in such a way that the result is even unexpected for the creator of the algorithm. This creates new philosophical questions: Who is the author – the person who created the algorithm or the machine itself that carried out the creative process?

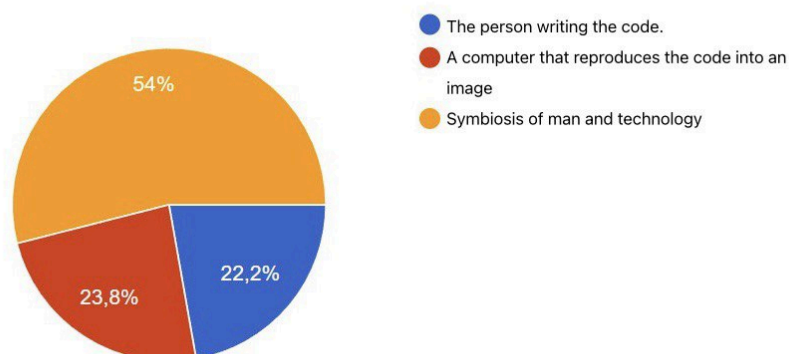
Is algorithmic art an art?



A survey was conducted among 65 people ranging from 11 to 70 years old to determine the opinions of people from different generations on this topic. It is also worth noting that all art is subjective, and therefore a definitive answer to whether something qualifies as art – in this case, algorithmic art – is unlikely. Observing the dynamics of art's development throughout history, it becomes clear that humanity is unlikely to ever come to a universally accepted and satisfying definition of "art." As a result,

only the quantity of opinions regarding age in relation to algorithmic art is examined. The diagram below shows the proportion of people who believe that algorithmic art is a product of human activity or that it is computer-generated.

Who is the creator of algorithmic art?



According to the conducted survey, the overwhelming majority concluded that the authorship of algorithmic art is based on an inseparable connection between the computer and the human, and it is this relationship that makes the genre unique.

A significant portion of those who classified algorithmic art as a separate genre were from the older generation (30+). Their conclusions were often based on the idea that any human creation

with meaning and an initial concept deserves to be called art. Artificial intelligence or the direct creation of artworks by a computer is not seen as an obstacle to expressing human opinions. At the same time, young people and the younger generation (11-25) tended to believe that algorithmic art, especially works created by artificial intelligence, lacks the emotions and feelings that humans imbue their works with during the artistic creation process in the classical sense. It is also important to note that most of the people who considered the computer as the author of algorithmic art were of the opinion that this genre does not qualify as art.

Conclusion.

Algorithmic art represents a new stage in the development of artistic expression, where the key role is not the direct intervention of the artist, but the development of a system of rules and algorithms that define the creation process. Unlike traditional art, where the result is determined by physical interaction with the material, here the artwork emerges as a result of computational procedures set by the author. This shift of focus from manual execution to programming raises questions about the boundaries of authorship and the status of the algorithm as a creative subject.

Historically, algorithmic art continues the line of conceptual art, where the idea and method are more important than the physical implementation. Its philosophical foundations are based on principles of systems thinking, mathematical modeling, and probabilistic processes, which bring it closer not only to art but also to scientific knowledge. This form of creativity demonstrates that an aesthetic result can be achieved not only through subjective artistic gestures but also through strictly formalized structures.

The complexity of algorithmic art lies in its dual nature: on the one hand, it requires the author to have a deep understanding of programming, mathematics, and computational methods; on the other hand, its results may go beyond the creator's complete control due to the randomness embedded in the algorithm. This circumstance raises a fundamental question about the boundaries of control and predictability in the artistic process.

The study of public perception of algorithmic art reveals a significant divergence in views between different generations. The older audience more often perceives it as part of the artistic tradition, where the human remains the key subject of creativity, despite the use of digital tools. Young respondents, on the other hand, tend to see it as a product of computational systems, which calls into question its artistic status. This difference in opinions highlights not only a cultural shift in the understanding of art but also a broader philosophical question: is creativity the exclusive prerogative of humans, or can it be delegated to machines?

The modern art market has already integrated algorithmic art into its structure, recognizing its commercial value and cultural influence. Leading museums and auction houses include works created by algorithms in their exhibitions, which confirms its status as a standalone genre. However, the question of its long-term aesthetic and conceptual significance remains unresolved, as its development is directly tied to technological progress and the capabilities of computational systems.

Thus, algorithmic art forms a new vector in artistic practice, where the boundaries between authorship, randomness, and programming become blurred. It questions traditional criteria of aesthetic evaluation and requires a reassessment of the concepts of creativity, art, and artistic intention. Regardless of perception, this form of art continues to evolve, confirming its significance as a phenomenon at the intersection of science, technology, and aesthetics.

Algorithmic art continues the tradition of conceptual art, emphasizing the importance of idea and structure over form and physical labor. It expands the boundaries of creativity by offering new approaches to creation, but at the same time, it makes us reflect on the nature of authorship, aesthetics, and the very essence of art.

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