

The role of digitalization in today's art: A perspective from NFT and artificial intelligence

Kerem Düzenli¹ 

Nazım Ziya Perdahçı² 

¹Master's Student, Mimar Sinan Fine Arts University, Institute of Science, Department of Informatics, Computer Aided Art and Design, Türkiye, e-mail: krmdznl@hotmail.com

²Assoc. Prof. Dr., Mimar Sinan Fine Arts University, Department of Informatics, Türkiye, e-mail: nazim.ziya.perdahci@msgsu.edu.tr

Abstract

Digital technologies have increased our ability to process images. Artists in the past had fewer tools at their disposal to create their artworks. There is a revolution in art today thanks to development of computer technologies. Activities of artists using new technological tools that emerge with digitalization can be defined as digital art. All branches of art where art and technology combine are within the scope of digital art. The main difference between traditional art and digital art is the medium where the artwork is created. In traditional art, a musician uses a musical instrument to display his work, or a painter produces his work with canvas and brush. In digital art, this occurs using technological devices. Many applications, from digital graphic arrangements to video installations, from virtual realities to artificial intelligence applications, fall within the scope of digital art.

This article's goals are to investigate how technology has affected art throughout history and to look at how digital art is created and sold. In this article, the impact of artificial intelligence on today's art and artists will be examined. NFTs, another controversial artwork of today, will be focused on and information will be given about the variants of these new technologies in today's art. Literature review and compilation were chosen as the method. According to the findings, artists who closely follow technological developments are the pioneers of the digitalization and dissemination of art. With the evolution of artificial intelligence from its first applications to the present day, artificial intelligence has now turned into a productive tool that can produce works that have never existed before, beyond being just an algorithm. In addition, it has been observed that, thanks to NFTs, digital art can escape the authority of art institutions, create its own autonomous space in a decentralized environment, and present itself as a digital asset open to everyone.

Keywords: Art, Digitalization, New media, NFT, Artificial intelligence.

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Corresponding Author/ Sorumlu Yazar:
Kerem Düzenli
E-mail: krmdznl@hotmail.com



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1. INTRODUCTION

Throughout history, the development of art has been directly proportional to the development of technology. These two concepts also appear as two concepts that distinguish humans from other beings. With the development of technology, human beings have engaged in art production using different techniques. Some technologies that did not exist in the past have encouraged artists to produce art with new techniques today. With the introduction of computers, reality has gained a new dimension. Virtuality has begun to replace reality in many areas and has begun to come to the fore in art production.

The digitalization of art began with the emergence of digital technologies and because of artists creating works using these new tools. With the rapid development and spread of computer technologies, especially after the 1960s, artists now have new tools, unlike their previous peers. By combining certain algorithms created with mathematics and logic with an electronic calculator, artists have created digital art. The term digital art, which emerged in this period, later appeared with different names such as "computer art", "multimedia art" or "cyber art". Nowadays, the term "media art" is generally used more widely (Miroshnichenko, 2021).

With digitalization, changes have been seen in many areas of art. These changes provide new opportunities for art and artists. On the one hand, the ongoing classical contemporary art production exhibits its works of art on websites with the effect of digitalization. In this respect, digital art enables better documentation and distribution of traditional works of art (Groys, 2017). Artists have had the opportunity to store their productions in the memory of computer with beginning of using computer for creating art works. In this way, it has become possible to reformat the work and make some changes on it. Especially with the widespread use of the internet and the development of computer technologies, artists have had the opportunity to disseminate their works to larger audiences.

The increasing influence of artificial intelligence in recent years brings with it many doubts

about the fate of artists. People to whom the title of creativity was attributed in ancient times were artists. Nowadays, a new rival for artists may have arisen. Because artificial intelligence, which was previously seen as just an algorithm, now appears with the ability to compile the information it contains or access and create a new product.

2. EVOLUTION OF DIGITAL ART FROM PAST TO PRESENT

Digital art is a new field of art that interacts with new media and pushes the boundaries of tradition. Digital art has been in an ever-changing form since its first appearance and appears under several different names. Between 1960 and 1990 it was called computer art, and towards the end of the 20th century it was called new media art. The name new media comes from the fact that this art is mostly used in fields such as photography, video, and painting. The word new mentioned here actually stems from the fact that this art does not introduce a new technique, but rather the techniques used in the past are reconsidered with the help of new technological devices (Paul, 2023).

It is possible to examine art from past to present in three stages: "traditional method", "mechanical reproduction" and "digital method". With the industrial revolution, some works of art produced by traditional methods became reproducible through mechanization and managed to reach large audiences. Especially after the 1830s, with the invention of photography, the reproduction of some traditional works became easier, and their spread accelerated. With the invention of the computer, the first steps of the digital era in art were taken. With this period, digital transformation accelerated, and engineers, programmers and artists began to work together.

It is thought that the origins of digital art lie in the Dadaism art movement that started in the 1920s. The reactions of Dadaist artists such as Marcel Duchamp and Tristan Tzara to World War I, industrialization and the bourgeoisie helped start this movement. Dadaism practices, which include photomontage, collage, object, or a performance based on political action, have

taken their place in digital art works (Erkayhan and Belgesay, 2014). The concept of Dadaism emerged simultaneously in New York and Zurich in the 1915s. In this movement, the concept of "Anti-Art" was emphasized. For example, Raoul Hausmann's sculpture "Mechanical Head (Spirit of the Time)", produced in 1920, stands in contrast to Georg Hegel's claim that "everything is mind" (Figure 1). Hannah Höch's "Cut with the Kitchen Knife Dada Through the Last Weimar Beer-Belly Cultural Epoch of Germany" contained a combination of dada and anti-dada elements. In this work, Höch wanted to show the role of women in the context of Germany and Dadaism. The artist made a collage with pieces cut from the current newspapers and magazines of that day (Figure 2). In this work, the artist used his works to express his disappointment that although many male Dadaist artists advocated gender equality, they did not act this way in practice (*Artland Magazine*, 2023).

Photo 1. Raoul Hausmann, Mechanical Head (The Spirit of our Time), 1920



Source: (*Artland Magazine*, 2023)

Photo 2. Hannah Höch, Cut with the Kitchen Knife through the Last Weimar Beer-Belly Cultural Epoch in Germany, 1919



Source: (Chadwick, 2006)

Another important impact on art is the digitalization of art with the development of digital technologies. Digitalization started with the emergence of computer technologies. Especially with the development of the internet, it has now become a part of our lives. After the 1980s, with the spread of computer technologies and the internet, the digitalization movement in art gained momentum. During this process, digitalization has also shown its impact in art.

With digitalization, art appears in new forms throughout history. In the article "The Work of Art in the Age of Technological Reproducibility" written by Walter Benjamin in 1936, the difficulties faced by art in the age of technical reproducibility were expressed for the first time. At that time, especially after the invention of the camera, the idea that photography could kill the visual arts became widespread. But this never happened, and rather than becoming a rival to the visual arts, photography carved out its own ecological niche (Miroshnichenko, 2021).

Many areas of art have been affected by technological developments. Not only visual

productions, but also other artistic productions have been affected positively or negatively. For example, works based on video and audio production have accelerated their transfer to the digital world with the transition of cameras from analog to digital environment. Works done with digital devices can be stored in smaller areas and reproduced more easily, as well as being shared unlimited times on computer networks and the internet. Moreover, network technologies have begun to create their own culture and have begun to be shared by users through different internet platforms and these networks. With digital art, the artist can produce his work personally in the digital environment, while works of art produced using traditional methods have the opportunity to reach large audiences on the internet.

2.1. Integration of New Media and Art

Nowadays, with the more widespread use of technology, the digitalization trend in art has gained momentum. Many museums and institutions focus on the exhibition and acquisition of new media art. These spaces not only serve as places where art is exhibited, but also as places where these works are recorded. Digital art was not only exhibited in these institutions, but also mediated the participants' interactive interaction with the artwork.

Digital art appears in many areas, from original software to virtual environments and organisms, from robots and body-worn implementations to machines. Recently, with the active entry of artificial intelligence into our lives, many works, from pictures to textual narratives obtained with a certain data set, are considered digital art. After computer technologies began to be actively used by artists, fields such as painting, sculpture, industrial design products and music began to be digitalized. Animations and similar types of video content have become widespread rapidly, and special units have begun to be allocated for such works in museums. It has paved the way for the use of photographic elements instead of paint and canvas in areas such as video installations and three-dimensional designs (Ersöz Karakulakoğlu and Demir Askeroğlu, 2018).

Christiane Paul examines the concept of digital art under three headings (Paul, 2023):

1. Digital technology as a tool: Artworks created with the use of digital technologies fall into this field. The computer is at the center of this production. Nowadays, it brings about some debates in the fields of photography and video. For example, there are debates over whether landscape paintings that used to be drawn by painters with brushes and canvases are now taken with a camera and whether these photographs are considered real works of art. In addition, the reproducibility of digital works of art is seen as a situation that prevents the uniqueness of the work of art. On the other hand, making the work of art more easily accessible to the masses also enables democratic sharing. In addition, in digital artworks, the artist can easily make some additions and deletions to his work if he wishes.

2. Digital technologies as media: Artworks developed in the digital environment are becoming increasingly common today. In these environments, participants not only can participate interactively, but also could experience art in a different environment. Recently, it is possible to come across digital media works that appear in many fields, from music to interactive films.

3. Digital technologies as content: This area contains works specific to the digital theme. Many themes fall into this field, from artificial intelligence to metaverse structures and some of the works exhibited in these structures. In addition, augmented reality and virtual reality technologies can be cited as examples of this field of art in terms of providing an experience in the digital environment.

2.2. The Role of Personal Computers in Digital Art Evolution

In today's world, where computers and the internet are rapidly evolving, the contributions of information and communication technologies to design practice have significantly influenced our perception and ability in design (Düzenli and Perdahçı, 2023b). The emergence of new materials and production technologies

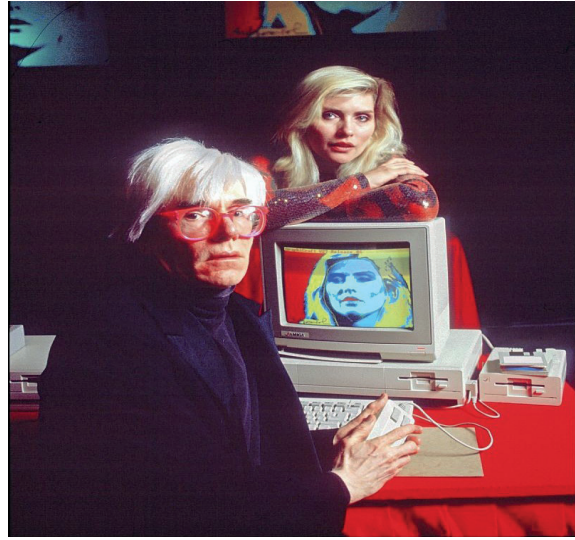
because of scientific developments, along with increased cross-cultural interaction facilitated by the internet, have had a significant impact on shaping design (Yazıcıoğlu, 2011). With development of computer technologies, many fields in human life started to change. In the beginning, computers were big machines helping us to calculate difficult problems, especially used in military purposes. However, since technology improves and miniaturizes, the concept of smaller computers occurred and so the personal computers.

Until 1984, computers were just machines which only a few people can communicate and use. A reason behind that, computers back then didn't have any interface, it was possible to use them just with the knowledge of coding or having the instructions of operating system. In the same year, Apple released the Macintosh, a groundbreaking personal computer that featured with a graphical user interface and a mouse (Eliuseev, 2021). The integration of hardware and software was so seamless, it was very organic drive to understand how to use this operating system with mouse.

The Macintosh made its mark on the art world in unexpected ways, like avant-garde artist Andy Warhol who known as revolutionary artist. He encountered this breathtaking technology at the birthday party thrown by Yoko Ono for her son Sean. Steve Jobs was among the guests, and he brought along one of Apple's new Macintosh computers as a gift for Sean. As Sean explored the capabilities of the Macintosh, drawing shapes and lines with the mouse, Warhol, along with other guests like Keith Haring, was drawn to the new technology (Marshall, 2018). Warhol's encounter with the Macintosh symbolized the intersection of art and technology in the digital age. Despite initially struggling to grasp the concept of using a mouse, Warhol's fascination with the device was evident as he began to experiment with drawing on the screen. This moment epitomized the transformative potential of personal computing in unleashing artistic creativity and expanding the boundaries of traditional artistic practices. Warhol's involvement with personal computer continued. Warhol incorporated the Macintosh

into his "Ads" series of paintings.

Photo 3. Andy Warhol with Debbie Harry at the 1985



Source: (Diggins, 2015)

2.3. The Impact of Digital Technology Use in Art

Today, technological reproduction has accelerated with the rapid development of communication technologies. Reproduction in art has become possible with devices such as computers and smartphones. This situation has led to the production of digital artworks in new environments and media art has progressed. Thus, new media and art came together to create new media art. New media art has enabled the development of different interactions between the work of art and the audience. Traditional works of art can now be created in the computer environment with new formatting methods. Thanks to these new tools, even people without art education have gained the ability to engage in artistic activities. At the same time, different branches of art have been brought together and the way has been opened to combine them around new digital technologies (Ersöz Karakulakoğlu and Demir Askeroglu, 2018).

Digital technologies have made it possible to produce art and to reproduce artworks indefinitely in digital form. Nonetheless, some groups believe that this circumstance could compromise the originality of the artistic creation. When a photograph is copied once, for instance, it is no longer possible to tell which

one is the original. It is possible to argue that art now serves a different purpose from this angle. Conversely, certain social media platforms facilitate the dissemination of artistic endeavors by granting non-professional users the ability to capture and manipulate images. The Instagram app can be used as an illustration of these social media settings.

Instagram, which was first developed for IOS (iPhone-iPad) platforms by Kevin Systrom and Mike Krigger in October 2010, has become widespread in a short time thanks to its user-friendly interface and easy-to-apply photo filters. These easy-to-apply photo filters attracted so much attention that this feature was considered the most important feature of Instagram that enabled it to spread faster than other platforms. In this way, many users have the ability to transform the photo they simply took into a professional looking work by using ready-made filters in a much shorter time, by using ready-made filters. Numerous users have benefited from the chance to enhance and share their own photographs that they have taken.

3. INTERNET, BLOCKCHAIN, NFT AND ART

The Internet is an interactive environment that has a complex network structure and works with a specific data transmission method. This environment is seen as a network structure containing nodes and connections. Data transfers are made between these nodes based on the TCP/IP protocol. This network structure, which had no specific center when it first emerged, enabled the development of the www (World Wide Web) in the early 1990s. This structure, which was initially designed to enable several universities to communicate with each other and share resources, was later used for military infrastructures. We can say that internet art started around the same time that the internet became widespread and used worldwide in 1995 (Kareva, 2020).

Blockchain technology is a type of ledger where data is recorded encrypted in a digital environment (*What is Blockchain Technology?*, 2023). Today, many cryptocurrencies work based on this new technology. The most well-

known of these is Bitcoin. Nowadays, blockchain technology is seen as an important development that will affect our daily lives. This technology, which is seen as a significant evolution in the security of personal data and storage of data records, is among the new methods expected to be used more frequently in the future. In this method, blocks are connected to each other and work as a new and secure recording tool. In this decentralized and transparent system, security problems are minimized.

3.1. The Role of Blockchain in the Art World

Blockchain technology is a revolution in issues such as the protection of works of art and copyrights of artists, especially for digital works of art. Today, NFTs produced using blockchain infrastructure appear as a way of storing digital works of art. NFT ensures that digital assets are protected by recording them in the blockchain infrastructure. It is also a certificate representing the rarity and ownership of the artwork (Düzenli and Perdahçı, 2023a). While NFT is in favor of digital art, it also serves as a vital safeguard against potential injustices to artists. It is generally accepted that the digital economy will play a significant role in the idea of digital art. In terms of the interoperability of art and technology, NFT and similar new technologies are candidates for supporting digital art. Thanks to NFT, artists now have the ability to sell all their works publicly and without intermediaries, while also preserving their copyrights.

With the rapid advancement of digitalization and technology, there is a transformation in the field of art, as in other fields. The concept of digital art has entered our lives with art developed with computer support and produced in virtual form. Digital art has added a new dimension to the creation and exhibition of works. NFT (Non-Fungible Token), which uses the blockchain infrastructure and means non-fungible token, is today seen as a tool for storing and exhibiting works of art. NFT; It protects the ownership of digital assets such as pictures, videos, photographs, music, virtual creations with smart contracts by recording them in the blockchain infrastructure. With NFT, ownership of the work is ensured, and the blockchain protects

this ownership. With decentralized blockchain technology, ownership remains with a single person, while at the same time everyone else can access the digital artwork (Yurdabak, 2022).

3.2. Digitalized Art and NFT

With the beginning of the computer age, computer programmers gained a special place in the field of art. Since the early 2010s, it has been observed that software developers have a special place in the art environment rather than curators, gallery owners, art critics and dealers. This is especially effective in the context of NFT technologies becoming widespread and artificial intelligence learning to create digital works of art. At first, the high sales figures of NFT works, rather than their aesthetic dimension, attracted the attention of societies more. With this new paradigm, the idea that works of art can be a digital output instead of a physical work has been adopted by some circles (Miroshnichenko, 2021). However, it is argued that a new form of materialism emerged in this process.

The destruction of the physical original of a work of art in a particle shredder as a performance by the artist is a representation of the new form of materialism. Banksy's *Girl with Balloon* painting was sold for 1.04 million pounds (\$1.4 million) at an auction in London. British anonymous graffiti artist Banksy published a video on his social media accounts stating that he placed a secret shredder on the painting a few years before the sale in case this painting was sold at auction. The artist also published Picasso's words on his social media account: "The urge to destroy is also a creative urge." (Preuss, 2018).

Photo 4. Banksy's *Girl with Red Balloon* painting



Source: (Preuss, 2018)

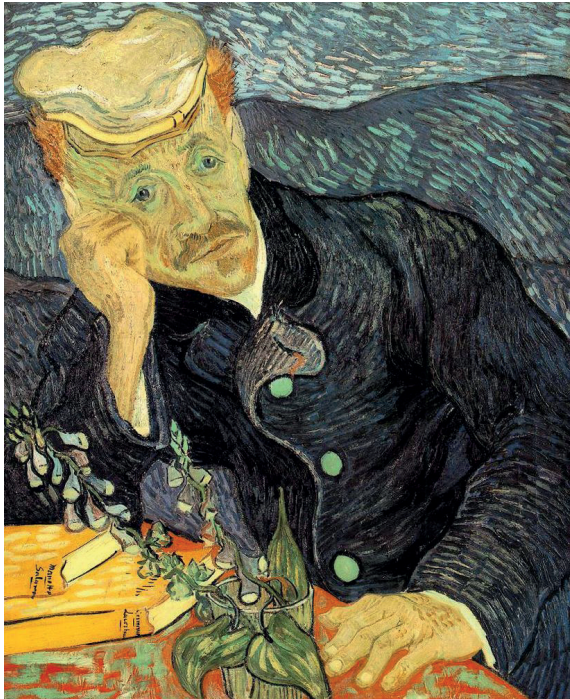
NFTs initially impacted auctions and the commercial sector of the art community. Auctioneers saw this technology to draw more attention to themselves and generate additional revenue from high-priced sales. But in such institutions, NFTs have some contradictions. For example, an NFT work may have thousands of owners and there may be some legal situations for digitally exhibiting the work.

3.3. NFT and Ownership of Artworks

While NFTs protect the ownership of the works, they also give the copyrights of the work to the owner. In the past, paintings made by famous painters were sold in small amounts, and the artist only received the fee for the first sale of the work. Thanks to NFTs, artists can also have the right to receive a share from the next sales of their works. For example, Vincent Van Gogh, one of the most famous painters of today, was able to find a buyer for only one of his works during his lifetime. From this sale, the artist earned only 400 Francs (1000 American dollars). Exactly 100 years after the death of the artist, who created over 2000 works throughout his

life, “Dr. His work titled “Portrait of Dr. Gachet” was sold at an auction for 82.5 million US dollars (Balkır, 2020). The artist’s family could not earn any income from the work, which was purchased by a famous Chinese businessman. It is possible to come across many such examples in the art world. NFTs have the potential to solve this problem. Thanks to the smart contracts contained in NFT technology, the artist has the right to receive a commission from each sale of the work in a certain amount. As an alternative to the traditional, NFTs act as a kind of notary. The blockchain infrastructure on which NFT is created secures the existence of the work. The correct use of these technologies will bring many benefits in the future. For example, selling and buying the work can be done safely and quickly with the cryptocurrency in the blockchain where the work exists. This method also ensures that the owner of the work protects the rights he has determined on the work and that future generations can earn a certain income from this work of art (Dowling, 2022).

Photo 5. Van Gogh, Portrait of Dr. Gachet, 1890



Source: (Balkır, 2020)

Items displayed in the physical world, at auctions and other markets, are often works of art with a long trading history or rare trade items

of historical value. In the digital world, it is very difficult to verify the accuracy and originality of the exhibited works. For this reason, these items have not been easy to trade or auction until now. NFTs are emerging as a new tool for artists to authenticate an original work of art and eliminate contradictions. This situation is seen as the beginning of a new era for digital art (Ante, 2021).

NFT started for the first time in 2017 in the CryptoKitties virtual game, with the token-based auction of in-game characters. NFT entered our lives with the trading of virtual credits within the game. An NFT associated with a digital artwork is stored in the artist’s digital wallet. This is the cryptographic signing of the work to symbolize its uniqueness and ownership. These transactions, which operate in the blockchain system, take place without intermediaries and securely. During the yellow manes protests in Paris, a graffiti representing the situation was drawn by French street painter Pascal Boyart. In this work, the artist was influenced by the work called “La liberté guidant le peuple”, which was made by Eugène Delacroix in 1830 and is currently exhibited in the Louvre Museum. Boyart turned his graffiti work into an NFT in case it disappears one day (Yurdabak, 2022).

Photo 6. Graffiti Work that Pascal Boyart converted into NFT



Source: (Boyart, 2020)

Artist Refik Anadol, who produces works in which we can observe the integration of technology and art and focuses on the interaction of visual arts with artificial intelligence, has produced some of his works as NFTs and offered

them for sale in the digital environment. One of these, his work titled *Machine Hallucinations – Nature Dreams*, was sold for 1.2 million dollars on OpenSea, an NFT sales platform (Yurdabak, 2022).

Photo 7. A frame from Refik Anadol's *Machine Hallucinations – Nature Dreams*



Source: (Anadol, 2021)

4. ARTIFICIAL INTELLIGENCE AND CREATIVITY

The act of creativity is considered a uniquely human characteristic. However, if we consider how creativity occurs, we can see that the human brain is in the business of producing a work by interpreting information that it has learned. From this angle, enabling a machine created by humans to manufacture specific items using the same method will enable the machine to carry out the same function. Today, artificial intelligence is quite advanced in terms of being able to produce a new product by examining the data set given to it through certain algorithms and mathematical rules.

Artificial intelligence can be used to generate new ideas and complete specific tasks. The production function of artificial intelligence can be used with 3 different techniques. These; the new data obtained because of synthesizing already produced ideas can be grouped as the discovery of the potential of conceptual fields and the production of ideas that were not possible before (Boden, 1998).

4.1. Meeting of Artificial Intelligence and Art

In recent years, generative networks and machine learning have led to the emergence of algorithms that can create their own images by

analyzing a sample dataset given to them. The work titled “Portrait of Edmond de Belamy”, sold at Christie’s auction in 2018, is a product of artificial intelligence. Contrary to the auction house’s estimate of \$7,000 to \$10,000, the painting was purchased by an anonymous person for \$432,500. This artificial intelligence algorithm, created by the Parisian artist collective Obvious, has ten other paintings created using this method, apart from this work. Portals of the series feature members of the fictional Belamy family. The artificial intelligence developed by the group is of the generative adversarial network type. This algorithm is trained on 15,000 portraits from the 14th to 20th centuries (Hartlmaier, 2018). The artwork is signed with part of his algorithm: “min max Ex [log(D(x))] + Ez [log (1 – D(G(z)))]”. Whether artificial intelligence can be considered a true creator is a controversial issue. Hugo Caselles-Dupré said the following on this subject (*Is artificial intelligence set to become art’s next medium?*, 2018):

“If the artist is the one that creates the image, then that would be the machine. If the artist is the one that holds the vision and wants to share the message, then that would be us.”

Photo 8. Portrait of Edmond Belamy created by GAN (Generative Adversarial Network)



Source: (Pamputt, 2018)

After the sale of the portrait, different opinions emerged. Those who viewed technology

optimistically experienced the joy of artificial intelligence reaching the last limit held by humans: creativity. However, some believed that machine art would diminish the value of the work produced by human artists.

Artificial neural networks, despite the many theories regarding artificial intelligence, are algorithms that can generate something within the constraints of the data they are given but are not capable of independent thought. Unlike humans, they do not produce something new by learning known images, they create a model based on statistical matches. This feature of artificial intelligence reflects the features of human visual perception, but it does not have the ability to interpret as in humans. The difference between machines and humans is that the result produced by the machine depends on the classification structures, structural features and facts specified to it by the human. These features are not ethically, aesthetically, or politically neutral. Today's artificial intelligence is limited to the facts given to it by humans and is not in the position of a creative subject.

4.2. Integration of Artificial Intelligence and Art

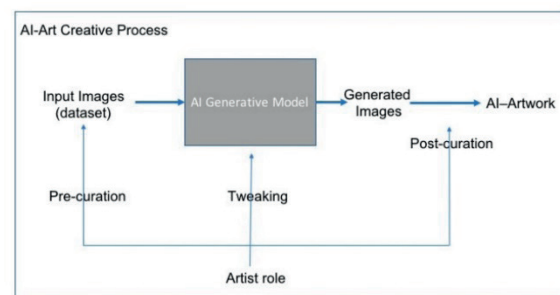
The fact that artificial intelligence can produce a new work by analyzing a certain series of works using a certain data set has led to discussions in some circles about reconsidering art and the artist. In some studies, it has been revealed that artificial intelligence is successful in its studies and can produce new works by analyzing a certain art-making style or detecting a large-scale style pattern in art history. GAN (generative adversarial networks) can be given as an example of artificial intelligence algorithms that enable the production of such works.

Some algorithm experiments have been made by different people from past to present. Harold Cohen and his program AARON are pioneers of algorithmic art (aaronshome.com). American artist Lillian Schwartz is another pioneer in using computer graphics in art, experimenting with artificial intelligence (lillian.com). However, with the development of GAN algorithms in recent years, the number of examples we see in this field has increased. This new application

of artificial intelligence has ushered in a new wave in algorithmic art (Schneider and Rea, 2018). Unlike traditional algorithmic art, in this new wave, artists no longer must write detailed algorithms specifying the rules of the desired aesthetic. Instead, a specific data set determined by the artist is given to the artificial intelligence algorithm, allowing the algorithm to scan this set and synthesize it using the machine learning method. The algorithm then starts producing certain images from this synthesis (Mazzone and Elgammal, 2019).

Art with artificial intelligence has accelerated with the development of GAN algorithms. According to the working principle of GAN algorithms, the artist feeds this algorithm with works of art from a certain collection or period. Then, the algorithm examines the works given by the machine learning method. In the last part, the artist can run the algorithm repeatedly until he finds the work, he likes best and enable him to produce new works. Here, the creative process takes place in the selection of the works given to the algorithm by the artist and the adjustment of the algorithm.

Photo 9. A block diagram showing the artist's role using the AI generative model in making art



Source: (Mazzone and Elgammal, 2019)

Regarding works produced with artificial intelligence, many are skeptical about whether these works are creative activities. There are also those who think that the works created with the help of artificial intelligence are not interesting. Because the outputs generated are ultimately a slight imitation of the inputs given to the algorithm. But the creative process here is not only in the outputs, but also in the stage of adjusting the algorithm and controlling the

inputs, the artist reveals his creative talent. In this respect, these works are evaluated in the category of conceptual art. It is thought that AI-produced works will become more sophisticated in the future as more artists use AI tools and discover how to manipulate the practices, they perform in the process of creating art.

Photo 10. Examples of images generated by training a generative adversarial network (GAN) with portraits from the last 500 years of Western art. The distorted faces are the algorithm's attempts to imitate those inputs



Source: (Upadhyay, 2021)

Some large technology companies have developed their own GAN algorithms and have attempted to produce some works of art using them. For example, Google's pattern finding software, DeepDream, has developed rapidly since 2015. The initial works were not rich enough and did not attract the attention of the art world. However, it can be said that with the advancement of technology in recent years, more successful results have emerged. These new studies attracted a lot of attention because the developed GAN algorithms can be trained to produce new and dramatic images that did not exist before.

Although works of art produced with artificial intelligence have attracted a lot of attention, some circles view these developments as just an exaggerated trend. Mario Klingemann, an artist working with GAN algorithms, states that although artificial intelligence can produce new works of art as if they existed, it is just a tool for artists and says (Schneider and Rea, 2018):

"Because they create instant gratification even if you have no deeper knowledge of how they work and how to control them, they currently attract charlatans and attention seekers who ride

on that novelty wave,"

Photo 11. A Vincent van Gogh-inspired Google Deep Dream painting



Source: (Cascone, 2016)

5. DISCUSSION

5.1. How Technology Transforms Art

With developing technology, our world is going through a radical change. Digitalization is one of the most popular topics currently on the agenda. Generally, digitalization is tried to be explained by comparing it with the industrial age. However, it is obvious that thinking of everything as a series of cogwheels is not valid in today's world. In the 21st century, with the widespread use of the Internet and the instant transfer of information, many things happen instantly. With this new structure, people exist as nodes in digital networks. In this way, a new understanding of social reality is created (Naveau, 2020). In this social reality, artists gain the ability to express themselves in a different environment and with different tools.

As technology transformed art, new forms of expression emerged, and these forms of expression began to push the boundaries in the art world. Art has always moved with the age it is in and used what existed in that age. The development of tools over time has also caused a transformation in art. The most striking thing about the point art has reached today is that art has now created its own autonomous field. Because in digital art, the nodes where artists exist operate like another social space with its

own rules.

A piece of art could previously only be deemed to be such if it was authorized by art authorities and shown to the public in settings that were suitable for it. But thanks to digital art, artists can use new media guidelines to share their creations with the entire world online. Moreover, by ensuring immutability and uniqueness with NFT, the rights of the artist can be protected and guaranteed. With the opportunities provided by this new decentralized structure, digital artworks can continue to exist in this environment. At the same time, in this environment free of intermediaries, the value, meaning and idea contained in the work of art can be directly determined by the end user and purchased without intermediaries.

Digitalized art is bought and sold within its own ecosystem, where intermediaries disappear, and the art buyer can meet the artwork directly. Especially recently, many high-priced sales in the NFT world have led to the question, which brings to mind the question "Is the most expensive work the most valuable work?" At this point, it is thought that the concept of value will be better determined in the future with the new rules of digital art. Therefore, artists learning these new media rules and acting within these rules can usher in a new era for digital art.

5.2. NFT Impact on Art - Opportunities and Challenges

While NFT offers a lot of new features for the artists, there are some considerations to discuss. From ethical issues to environmental threads, NFT and the changes it brings along with has a lot of effects on today's art and artists.

One of the main concerns with NFT art is the accessibility of the technology to everyone. Although the potential for democratizing art, this technology serves for the people who have resources to access in NFT markets. Additionally, for many artists who created their artworks as a NFT, they announced their work through support of famous art institutions. Without these support and investment, many of artists such as Refik Anadol, could not be able to show and present their artwork to the world even if

their artwork is fully digitalized and existed in blockchain environment.

NFTs are very useful mediums for storing the artwork secure. However, this feature can be exploited by certain entities. For example, Injective Protocol and Unique One Art Marketplace have been known to convert physical artworks into NFTs and subsequently destroy them to emphasize the importance of NFTs and boost the value of digital assets. This action disregards the emotional significance of physical artworks and solely focuses on enhancing their digital value (Shaw, 2021). Conversely, the act of destroying the physical form of an artwork to convert it into an NFT underscores the irreversibility of this transformation (Ennis, 2021). This notion is exemplified in Murat Pak's "burn.at" project, where individuals must burn their NFTs to earn cryptocurrency. This act signifies the complete removal of the artwork from the blockchain, highlighting the potential for NFTs to be destroyed by their legal owners (Oduncu, 2022). Additionally, the rights afforded by NFTs, such as the artist's entitlement to a percentage of each subsequent sale, are now also being recognized in traditional art auctions (Ditrychová and Kozáková, 2019).

The art world is evolving rapidly due to the digital age, and Non-Fungible Tokens (NFTs) play a pivotal role in this transformation. Platforms like OpenSea have amassed over 250,000 active users in the NFT market, indicating a significant interest among art enthusiasts. However, it's crucial to acknowledge the challenges associated with this digital revolution. For instance, the sale of artist Pak's "The Merge" artwork for a staggering \$91.8 million highlights the immense potential of NFTs, while collections such as the "Bored Ape Yacht Club" boast a transaction volume exceeding \$2.5 billion, underscoring the substantial value of NFT collections. Despite these promising figures, the ecological footprint of NFT technology cannot be ignored. A single transaction on the Ethereum blockchain consumes approximately 77 kilowatt-hours of energy, equivalent to a month's energy consumption of an average television (NFT Market Statistics 2021-2023, 2023). The annual energy consumption of the Ethereum blockchain alone is estimated to be

around \$6 billion, resulting in approximately 22 tons of carbon dioxide emissions. However, efforts are being made to address this issue. Ethereum 2.0, for example, significantly reduces energy consumption compared to Ethereum 1.0. Moreover, alternative blockchain networks like Solana, Cardano, and Polkadot, equipped with smart contract technology, are actively working to minimize energy consumption (TabTrader Team, 2023). According to the Crypto Carbon Ratings Institute's 2022 report, the energy consumption of these networks stands at 1,967,930 kWh, 598,755 kWh, and 70,237 kilowatt-hours, respectively, further emphasizing the industry's focus on energy efficiency (Crypto Carbon Ratings Institute: CCRI, 2022).

The rise of Non-Fungible Tokens (NFTs) has transformed the art world, offering both opportunities and challenges. While NFTs empower artists to showcase and safeguard their work, concerns about accessibility and exploitation require attention. Additionally, the environmental impact of NFTs, especially in energy consumption, highlights the need for sustainable solutions. Nonetheless, NFTs hold significant potential in democratizing art and empowering creators. Collaboration among stakeholders can navigate these issues and build a more equitable and environmentally conscious future for the arts.

5.3. The Future of the Relationship between Art and Technology

The advancement of digital art and technology is of great importance for the future perspective, as the relationship between art and technology will affect the future. Technological developments have a great impact on the transformation of art. The transformation of digital art is progressing in parallel. Artists have benefited from the opportunities of developing technology while producing art. This also applies to digital art. The difference of digital art is that it does not have to emulate the traditional to exhibit its own existence. Digital art has created its own ecosystem with developing technology, provided its own methods and its own economic existence (Vargün, 2023).

The development of digital art will develop in parallel with technological advances. The development and spread of computer and virtual reality technologies will affect the lifestyles of societies and will also cause changes in art. Mark Tribe, one of the founders of the rhizome.org website, which emerged in 1996 and works on the preservation of digital art and culture, has identified 4 methods of preserving digital art (Wands, 2006).

1. Documentation: Documenting diagrams, installations, or descriptions from the artist's work by capturing screenshots.
2. Migration: Translating an old work into new technology and file formats through updating efforts.
3. Emulation: Updating the product with software that will enable it to work with newer hardware.
4. Re-creation: Recreating the work of art in a new environment.

These methods are used to preserve the work of art in accordance with changing technological conditions and to transfer it to future generations.

Artists can now securely store their works in the blockchain infrastructure thanks to NFTs, a byproduct of blockchain technology. The owner of an artwork previously acquired the rights to it upon purchase when an artist offered their creations for sale and a buyer was found. Because of this, neither the owner nor his family was entitled to a portion of the proceeds from the sale when the piece was sold years later for a price that was significantly higher than the original purchase price. With NFTs, the artist retains the right to receive a determined percentage share from the future sales of the work. In addition, the blockchain where the NFT resides may also contain its own cryptocurrency. In this way, the owner of the work can sell his work in cryptocurrency on this network, and then exchange this cryptocurrency for physical money or another cryptocurrency. However, this situation is confused with the token containing the NFT. NFTs document the authenticity of artworks thanks to non-fungible tokens, the technology in which cryptocurrency is used. These tokens cannot be traded with each other because each token is unique. In addition, many blockchain networks support NFT creation.

Examples of this include blockchain networks such as Ethereum, Solana, Polygon. However, an NFT artifact can only be stored in one network at a time and cannot be found in any other network. For the buying and selling of these products, virtual wallets containing the cryptocurrency of that network are needed. From the artist's publication of his work to the sale of the work and many other transactions take place directly between the artist and the art observer, completely without intermediaries. With this feature, crypto art finds its place as a unique field where decentralization prevails (Düzenli and Perdahçı, 2023b).

5.4. Artist and Artificial Intelligence

Artificial intelligence is a set of algorithms produced to function in areas such as decision making, image recognition, language understanding and creativity, which were previously considered uniquely human activities. According to Aaron Hertzmann, artificial intelligence may be a tool designed for art production, but it is never an artist. Art is produced by social actors and therefore computers cannot be seen as artists (Hertzmann, 2018). Hermann sees AI as a tool of the artist, like a painter's brush. However, there are also circles that argue against this view. According to those who hold the opposite view, artificial intelligence is not an unchanging and inanimate object like a brush. A brush does not have the ability to change and progress, and it cannot make inferences or learn new things based on past drawing experiences. However, in this regard, modern artificial intelligence is highly developed. Because artificial intelligence can gather and extracting information, one of its most potent features is that it gets better with use.

Many artists and art historians are reluctant to see works created with artificial intelligence as art. Because, according to many, the figure of the modern artist is a necessary element for the definition of art. That being said, it is a relatively recent understanding to define art as the unique expression of the artist. For many centuries, artists have created works of art for a variety of reasons. Naturally, a machine cannot produce

art in the same way that a human can or emulate human experience. After all, the motivation to create art differs between humans and machines. The machine is motivated to create art because it has been given the task of doing so. Even though machines and humans create art in different ways, a machine's creation that is deemed artistic after a distinct process cannot be discounted (Mazzone and Elgammal, 2019).

Over time, artists will gain experience in using the possibilities of artificial intelligence better. With this new tool, the art world may have been offered a new environment to realize art. These algorithms are still quite new. It is believed that as mathematics, hardware, and software all advance over time, artificial intelligence will likewise grow. More people in this field are needed in order to fully comprehend the role that machines play in the creative process. Though many works created and displayed today use artificial intelligence algorithms, it is believed that as artists and computer scientists gain more knowledge, artificial intelligence will be used in art even more in the future.

6. CONCLUSION

Unlike the past, when artists had limited tools to exhibit their works, today many new tools are available to artists. The invention of the computer and the development of digital technologies in the last century have led to the emergence of a new era of art. The age of digital art has begun in the art world because of the integration of digitalization with new media. Covering a wide range of areas, from digital graphic design to video installations, from virtual reality to artificial intelligence applications, digital art has enabled artists to create and publish their works in new ways, thanks to the use of technology. In this way, a new art form has emerged that is not limited to traditional methods and mediums.

With the impact of digitalization, studies in the field of machine learning have accelerated. Thanks to advanced algorithms, machines have evolved into a form of artificial intelligence and have become able to interpret a certain data set in line with the user's request. Although artificial intelligence is still in its early stages,

it appears to have use areas in the art world. Although artists have begun to use these new tools to create new art forms, this technology is still in its development stage. Although there are many works of art produced through artificial intelligence today, it is thought that artificial intelligence will be a more powerful tool for artists in the future as mathematicians develop new algorithms, hardware becomes stronger, and software becomes more sophisticated. However, to better understand the role of machines in the creative process, the number of people working in this field needs to increase.

It can be said that with the spread of the internet and the expansion of its usage area, a new environment for artists to perform and exhibit art has emerged. Some studies are being carried out on systems that will solve the problems of today's internet and eliminate central authorities. Blockchain technology appears as a solution in this field. With the influence of digitalization, traces of blockchain technology are also seen in the field of art. NFT (non-fungible token) technology, which uses blockchain infrastructure, is a topic that has begun to be discussed in the art world. NFTs allow digital art to create its own autonomous space in an independent and decentralized environment, beyond the authority of art institutions. In this way, artists could safely exhibit their works, offer them for sale without losing their copyrights, and store them in an unalterable manner. In addition, with the smart contract feature of NFT, artists have the right to receive commission from the subsequent sales of their works. With the development of technology, NFT is expected to become more widespread in the art community.

As a result, it can be said that with the integration of art with technology, the boundaries of traditional art have been surpassed and a new era of art has emerged. In this new era, with the use of technology, a new tool was added to the production methods of art, a new environment was created in which art could take place, and art had the opportunity to be distributed and reach the observer within the framework of a more democratic structure. It is expected that artists will use artificial intelligence and other technologies more actively in the future to create

new art forms. With the use of NFTs, digital art could exist in its own autonomous space in a decentralized environment.

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