REFIK ANADOL'S CONSTRUCTION OF SPACE AND TIME: SYNESTHESIA BETWEEN MACHINES AND HUMANS

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Abstract: The media artist Refik Anadol's acclaimed work Machine Memoirs: Space inaugurates the first permanent immersive digital art gallery in the UK, The Real Store. Utilizing machine intelligence to recreate images of the International Space Station, telescopes and NASA satellites, Machine Memoirs: Space provides viewers with an immersive experience of lush visuals and stunning 3D sound, allowing them to experience the spectacle of various spaces. In the age of artificial intelligence, when time and space can be transformed into multiverse experiences by machines, what does it mean to be human? Similarly, a central theme of Andreas Broeckmann' s book Machine Art in the Twentieth Century is how machines impact the interaction between humans and artistic creations. The author examines aesthetics of machines in art and relationships between machines and people by analyzing a variety of artworks in the twentieth century. Within the theoretical framework of Andreas Broeckmann, this study argues that machine-based algorithms in artworks create spectacular artistic experiences through synesthesia between machines and humans. Additionally, the challenge for the human subjectivity is posed by the technicity of visual perceptions. The contributions of this study are divided into two aspects. The investigation of Refik Anadol's works may contribute towards a better understanding of the theoretical framework of machine art. Additionally, the explanation of the relationship between technology, humans and artworks provides some clues for future digital art creations.

Keywords: Refik Anadol, Andreas Broeckmann, synesthesia, digital art, machines, humans

Introduction

Since 20th century, a growing body of literature has focused on how significant machine art is. More importantly, more AI-generated artworks are gaining increasing attention. One of the first AI-generated works to win an award was Mr. Allen's "Théâtre D'opéra Spatial" at the Colorado State Fair's annual art competition. The changes that artificial intelligence brings to the work of art become a problem that is difficult to avoid in the creation of artists. How to deal with the relationship between machine and man will be the situation facing the artwork. Under these circumstances, it is necessary to address the development of machine art and the relationship between machines and humans to offer fresh perspectives for future art creation.

Art historian Andreas Broeckmann' s book Machine Art in the Twentieth Century is regarded as the first book to explore how artistic engagement with technical systems. The historical examinations of artworks in the early 20th century show how the role of technology brought a radical revaluation of creations of artworks. More importantly, as for what machine art is, from the perspective of Broeckmann, he argued that, it refers to 'artistic works and practices that implicitly or explicitly

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articulate the relation between subjects and machines'[1] The machine art encourages artists to explore the relationship between machines and humans. Artists from different fields have various ways of interpreting machines, and technology in their works. In today's age of machines and digitalization, the media artist Refik Anadol has created a number of artworks and installations, which embedded media arts into machine and artificial intelligence. With the help of algorithms, Anadol represents vivid constructions of space and time in his public art and installations, which contributes to understanding digital media and architectures in the contemporary art. By examining Refik Anadol's constructions of space and time in his artificial intelligence work Machine Memoirs: Space and Andreas Broeckmann's research on machine arts, the study seeks to explore the relationship between machines and humans. There are increasingly technological elements in works of art in today's digital age. It is necessary to examine how the advent of machines affect the creation and production of works. The importance of this study is that it attempts to explore how machines interact with works of art from both a theoretical and practical perspective, thus offering fresh perspectives on establishing a systematic theoretical and practical framework of future artificial intelligence works.

The formation of Symbiosis between Machines and Humans in Refik Anadol's Works

In Anadol's work, the symbiosis between machines and humans is formed mainly because of his perception of the machine intelligence. The experience of studying photography, video, visual communications and fine arts enables Refik Anadol to use digital media art to redefine contemporary architecture and interior design. His company, Refik Anadol Studio and Lab, is devoted to the exploration and development of new approaches to artificial intelligence and data narratives in an era when technology is highly influencing art. As machines become more and more prevalent in our everyday lives, what do machines mean for humans? Are there unlimited challenges or multiple possibilities? The collision and fusion of digital spaces and media technology has become important themes in his work. The last few years have witnessed that the digital age and machine intelligence allow for some new aesthetic techniques to be developed, thus creating immersive and dynamic environments with enhanced audio-visual perceptions. The multi-sensory experiences brought about by new technologies will influence how artworks are created. Within this context, Anadol explores many ways in which the symbiosis between machines and humans is formed and the perception and experience of time and space will be radically changed in the future. His practices provide viewers with opportunities to experience the interaction and synesthesia between machines and humans, but also poses some problems.

Anadol's creations of space and time are closely associated with his early exposure to machines. His childhood days of watching Blade Runner and using a computer fueled his imagination and opened a new space for his creations. The early exposure to machines allowed him to make speculations that, 'what will happen if machines can start dreaming?'[2] From the Anadol's perspective, machines are no longer made of cold, emotionless data. Even though machines cannot dream in real life, in the future, machines may have the ability to learn and even generate some of their own ideas by studying the patterns of people's cognitive systems. This explains why Anadol has a positive attitude towards

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[1] Broeckmann, A. (2016). *Machine art in the twentieth century* (p. 29). Cambridge, MA: The MIT Press.
[2] Belogolovsky, V. (2022). *Refik Anadol tests new possibilities for experiencing digital space*. Stirworld.com. Retrieved 26 September 2022, from https://www.stirworld.com/think-columns-refik-anadol-tests-new-possibilities-for-experiencing-digital-space.

machines being able to dream and have hallucinations in the future. With the involvement of machines, iconic landmarks and museums around the world have turned the traditional definition of architecture upside down because of his audiovisual works. The involvement of physical and digital elements pave way for his constructions of synesthesia between machines and humans, this is mainly because they provide multiple visual sensations. Moreover, Anadol's post-digital architecture proposes the possibility of creating a spatial experience formulated on a multisensory basis, both visually and visibly through architecture, thus allowing perception to be heightened on a level beyond visibility, and thus enabling spatial perception to become something more than visual.

Taking place at Istanbul's Pilevneli Gallery from 19 March to 25 April 2021, Machine Memoirs: Space is the studio's most comprehensive solo exhibition in Istanbul to date. Images captured by outer space telescopes, satellites and spacecrafts are explorations of the relationships between data, history and memory. In this collection of images, a vast amount of digitized information is incorporated into the creation of an abstract form that depicts the intricacies of an alternate universe of data. Machine Memoirs: Space is an excellent attempt to integrate digital technology into public spaces. Image how different this experience is from viewing these photos on our computer screens? From my perspective, the sense of interaction brought about by the scene prompts space and time to be more dynamic, to the extent that there is an emotional resonance between humans and machines.

Theoretical Constructions of the Machine-human Relationship: Andreas Broeckmann's Machine Art in the Twentieth Century

Theoretically, Andreas Broeckmann explores the most important historical developments and key concepts of machine aesthetics in his book Machine Art in the Twentieth Century. This book provides a comprehensive overview of machine art, and explore the changing relationship between humans and technological devices and infrastructures in the modern age. In Brockmann's view, machines are viewed as having a life similar to that of humans. There has been a paradigm shift in the artists' perceptions of technology and the role of humans as creators of art with the advent of machines, such as computers, and robots. It has become clear that artists have had greater opportunities to communicate their ideas and audiences through the use of computers due to the ability of these devices to manipulate the visual field and set up specific materials. The contribution of Brockmann's study is that the term 'machine' is not confined to traditional historical and technological disciplines, but 'a relationship that human subjects have to the world.'[3] His insights offer a fresh perspective on the relationship between humans and machines in the contemporary period. Machines are not merely technical equipment, and the way it is transmitted and produced can have a great impact on the work of art. His definition of machine opens up a wealth of ideas for our understanding of digital artworks.

The Symbiosis of Excitement and Danger in Anadol's Constructions of Spaces

Anadol's constructions of spaces are characterized by a symbiosis of excitement and danger. His project Machine Memoirs: Space is influential and exciting, this is mainly because this exhibition provided many beautiful photos of satellites and spacecrafts, which were taken by NASA. The sample images of ISS (International Space Station Earth), HUBBLES, MRO (Mars Reconnaissance Orbiter) (Figure 1, 2, 3) have vivid colour, varied textures, and considerable details. The images are more imaginative and fantastical than the scenes in the documentary. There are roughly three steps involved in the formation of images, including ISS, HUBBLES, MRO archive, machine learning classification,

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[3] Broeckmann, A. (2016). *Machine art in the twentieth century* (p. 17). Cambridge, MA: The MIT Press.

and image preprocessing. To produce the dataset, over one million photographs were collected from the ISS Earth, Hubble image archive, and 800 thousand photographs from the MRO archive. Afterwards, a feature vectorization algorithm is applied to the compiled dataset, which is based on an image-recognition algorithm called VGG-16. Following the computation of those features, the dataset is qualitatively filtered. A post-processing process that increases the resolution of raw images and reduces compression artifacts is then performed on the filtered images using an ESR-GAN algorithm. As a result, the images are cropped in accordance with the same aspect ratio. Anadol's use of algorithms contributes to our knowledge of how machines serve artworks, thus changing the way traditional architecture is presented and perceived in public art spaces. As such, machines enable viewers to have unique experiences, and this is why his creations of spaces can bring excitement.
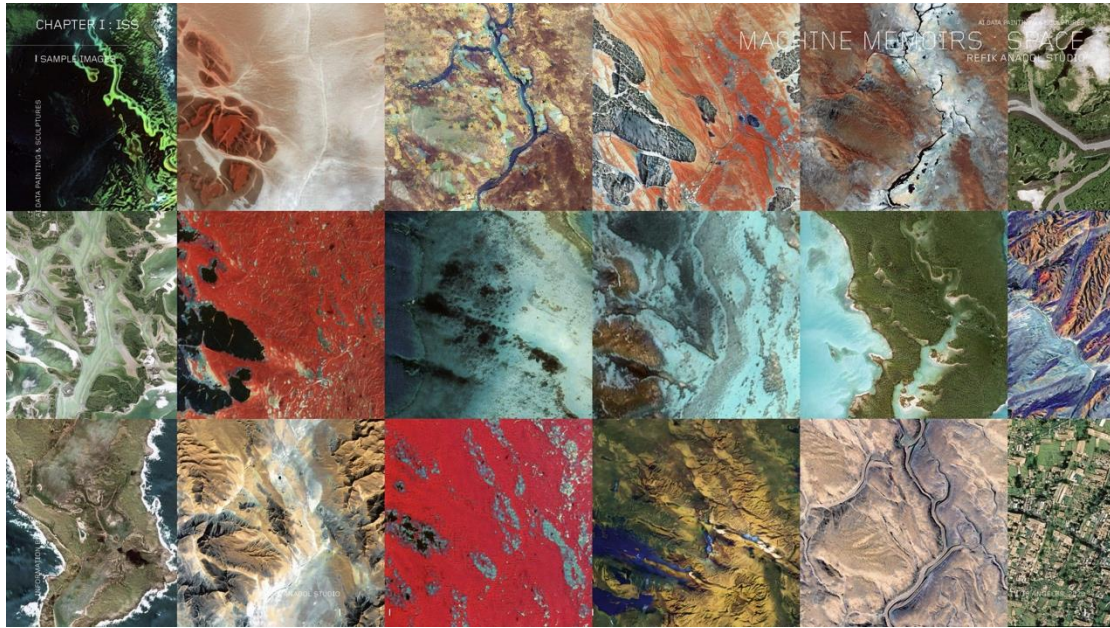

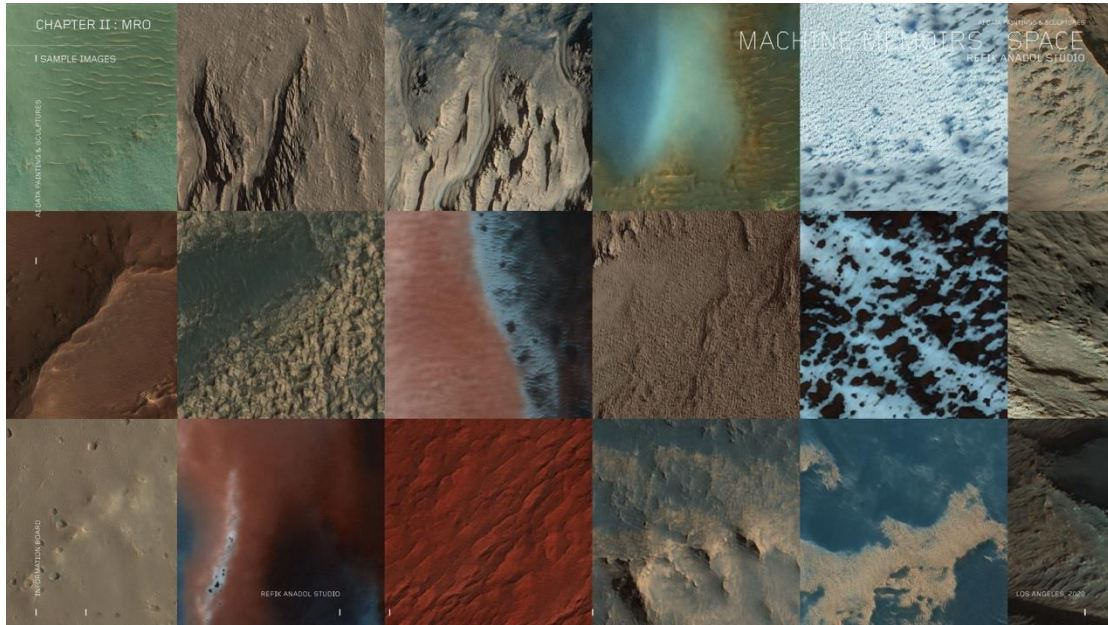*Figure 1: Refik Anadol, Machine Memoirs:Space, Chapter 1: ISS, Sample Image*

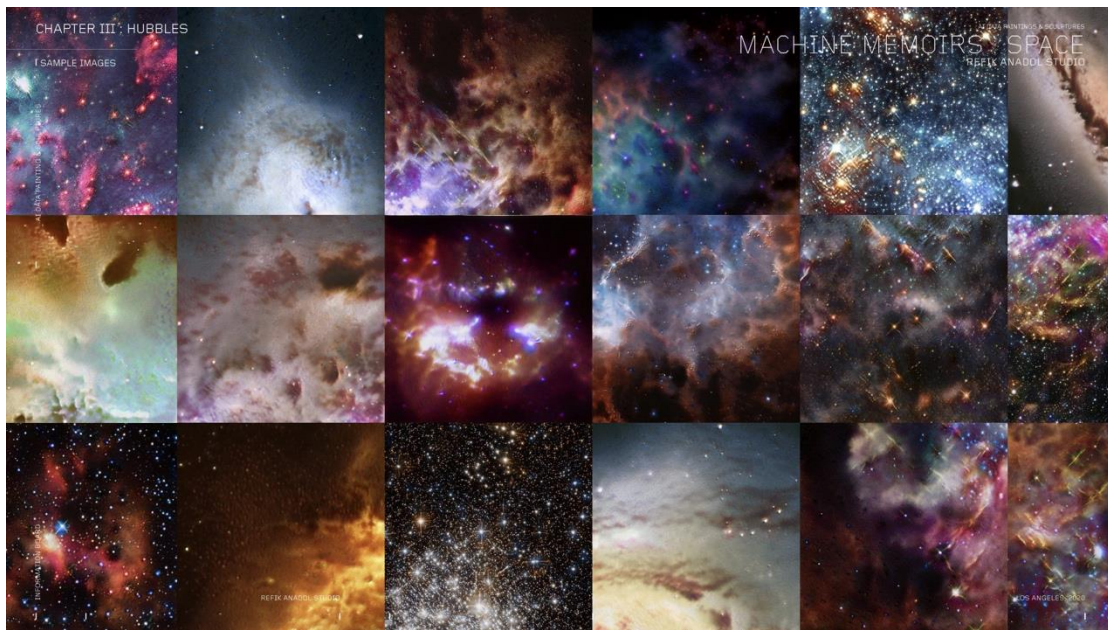*Figure 2: Refik Anadol, Machine Memoirs: Space Chapter 2: MRO, Sample Image*

Figure 3: Refik Anadol, Machine Memoirs: Space, Chapter 3: HUBBLES, Sample Image

The sense of excitement comes mainly from uses of digital computer techniques, such as coding algorithms and data processing. These technology methods also require the conversion of electronic signals into output devices such as sound or LCD displays. Brockmann's insights into the algorithm contribute to our understanding of Anadol's spatial constructions. In Brockmann's view, it is not a technical or the digital system, but 'a particular form of coding symbolic content.'[4] The coding symbolic feature of the algorithm create an exciting rapport between viewers and artists. From the perspective of viewers, Anadol's presentations of fabulous spaces of galaxy, outer space and other celestial bodies enable viewers to perceive and explore the ever-changing spaces, which are hard to

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[4] Broeckmann, A. (2016). *Machine Art in the Twentieth Century* (p. 90). Cambridge, MA: The MIT Press.

achieve in real life. The 360-degree wrap-around scenes allow viewers to capture spectacle of spaces using waves of light and colour (Figure 4). Splendid scenes of light and electricity come to life in this interaction. However, for the somewhat densely-phobic viewer, such splendid scenes may seem a little dazzling.

Figure 4: Exhibition view from Refik Anadol's "Machine Memoirs: Space" at Pilevneil Gallery in Istanbul, Turkey

As far as I am concerned, Anadol's constructions of spaces also pose a danger to the viewers' perception, thus creating a symbiosis of excitement and danger. Despite the machines' ability to deliver exquisite sensory physicality, visuality is actually in a state of compromise. That is to say, the work viewers see is the product of a reconciliation between the machine and Anadol's creation. From the perspective of viewers, in fact, all they can do is perhaps feel and interact. In other word, the representation of immersive artworks and installations is a manipulation of viewers. Broeckmann argued, 'Even the purely technological interpretation of visually acquired data still implies such an act of "maneuvering," that it is still politically informed.'[5] These images are operational, which determine viewers' behaviour and have already become functional and technical component. Machines with physical and functions features determine the whole process of operations. Without the involvement of the machine, the whole work would not even exist. The advanced and automated production of machines limit the consciousness of viewers. Broeckmann's understanding on human perceptions is provoking, as he said, 'one's visual perception is a process directly coupled to the technical medium in front of the eyes, and able to bring about phenomena, optical or rather visual illusions, that only exist under the media-technical conditions of this particular human-machine dispositive.'[6] On this level, human perception is already closely linked to the presentation of technology, so how the viewer can be enabled to perceive and embody more through technology is the focus of the digital work. Therefore, following the breathtakingly pleasing visual experience, perceptual limitations are creeping in.

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[5] Broeckmann, A. (2016). *Machine Art in the Twentieth Century* (p.134). Cambridge, MA: The MIT Press.
[6] Broeckmann, A. (2016). *Machine Art in the Twentieth Century* (p. 152-153). Cambridge, MA: The MIT Press.

This splendid scene can also be dangerous for the artist's creation. In terms of spatial performance, technological elements fill almost the entire scene. From the perspective of creations of artwork, what role does technology really play? It's true that the addition of technology can elevate an artist's work, but does the final presentation vary somewhat? Of course, there is no denying that the unforeseen circumstances are an important part of the artwork. It is also possible that the artist may be overly interested in technology and scenic effects and lose sight of the point he or she is trying to make in the work itself. This is also an issue that we cannot ignore. Therefore, the perceptual exhaustion of the viewer and the lack of creativity of the artist constitute a symbiosis of danger and excitement.

The Synesthesia between the Past and the Present in Refik's Constructions of Time

The German philosopher once said that, 'every image of the past that is not recognized by the present as one of its own concerns threatens to disappear irretrievably.'[7] Connecting the past with the present is one of representational features of image creation. It has to be admitted that in today's society, where everything can be replaced quickly. The work the viewer enjoys today may soon be forgotten. The construction of time will be even more profound for the work and for society, because consumptions of fast-moving products may make people numb and lack the ability to ponder art. Anadol's manipulations of space bring wonderful enjoyment to the viewer. In my view, in Refik's constructions of time, there is a synesthesia between the past and the present. That is to say, his understanding of machines, in terms of time, powerfully connects the past and the present.

The second section of an immersive artificial intelligence cinema installation (Figure 5) is also the most impressive part of Machine Memoirs: Space. The space is totally different from our traditional cinema, which requires sitting in a cinema to watch a movie. Here we are entering into a space that is not only a synthesis of photographic archives but also a living cosmos, in which dreams play a fundamental role in the expression of artistic thought. The dynamic and immersive environments reflect technology and vividness of artificial intelligence. The audio-visual impact will allow the maximum functionality and meaning of the moving images to be presented. For viewers, close and analytical gazes allow for a more comprehensive and in-depth understanding of the artist's work. The interactive artificial intelligence cinema provides viewers with opportunities to compare it with past traditional cinemas subconsciously and express the progress of technology. In a sense, Anadol's installation of artificial intelligence cinema is also a witness to time. Perhaps many years from now, Anadol's interactive cinema will also be a source of inspiration for many digital artists to create more advanced interactive spaces. Through his work, we feel the interaction between the past and the present mainly through the significance of examining past works in today's predominantly digital context. As such, the relationship between machines and humans has always been intertwined. In the past, perhaps the machine was not so advanced, but it represented human intelligence. People gained convenience in their lives. Nowadays, technology offers people a richer and more diverse range of senses, including sight, touch and even smell, and these experiences can provide mental pleasure.

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[7]Owens, C. (1980). The Allegorical Impulse: Toward a Theory of Postmodernism. *October*, *12*, 67. https://doi.org/10.2307/778575.

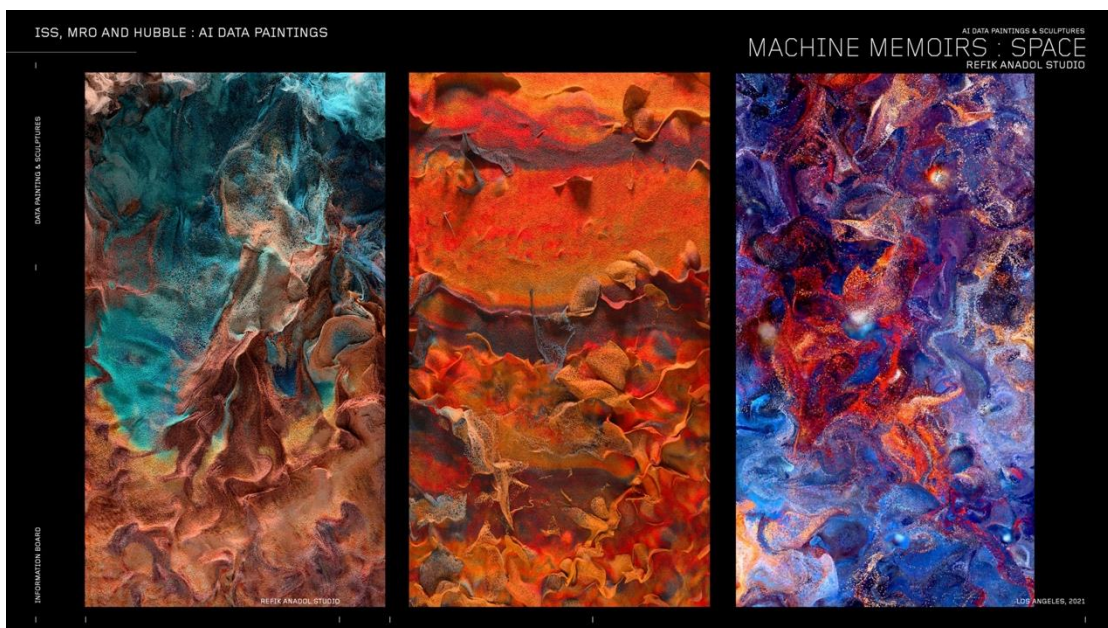*Figure 5: Refik Anadol, Machine Memoirs: AI Cinema*

Figure 6: Refik Anadol, ISS, MRO and HUBBLE: AI Data Paintings

What also needs to be acknowledged is that overly realistic and vivid scenes brought by machines pose another problem for humans. The issue is that machines sometimes easily make the artist ignore the exploration of the work itself, and may fall into a vicious circle dominated by technology. From this, the relationship between machines and humans is not entirely beneficial. As we can see in artificial intelligence data paintings (Figure 6), the technical aspects, including texture, contrast and colour reproduction exceed those of direct camera shots. This poses a question, what is the purpose of the photographer's existence if the images can be composed and reconstructed by computers or machines, is it to provide a source of creativity? Broeckmann's research on image machine offers insights on understandings of images. He introduces the concept of "image anthropology", which was

proposed by the German art historian Hans Belting. In Belting's view, in order to gain a clear understanding of images, one need to consider the methods of creation and the media through which they are created, as well as the bodies that perceive and evaluate them. Images are not bound to their surface appearances, and they must be extended to the media through which images are made, and represented. Additionally, as Broeckmann said, 'it seems to make little sense to ascribe to a technical apparatus the ability to perceive and understand an image as such.'[8] Technical equipment has limitations on the perception of images. It has to be acknowledged that technology is, after all, a human creation, and its programming and automation can lead to a repeatable, even somewhat mechanical, cycle of human experience. Therefore, prolonged exposure to the work of machines may cause problems of visual fatigue for the human being.

Yet another important issue that cannot be ignored is the aesthetic status of the technical devices. It is unreasonable to define a work of art has aesthetic qualities or not. That is to say, it is not the case that a work by traditional means is imbued with aesthetic qualities, whereas a digital one is not. As we can an artificial intelligence data sculpture (Figure 7), its texture and shape have futuristic, technological qualities. The physical structure in the traditional sculptures gradually disappear. What do the textual and aesthetic shifts mean for the sculptures in the past and present? The aesthetic potential of artworks, in a sense, offers the possibility of rethinking the work that the viewers see in front of them. The aesthetic status of artworks is also recognized by Broeckmann, as he argued, 'A particular aspect of the aesthetics of an artwork can be to counteract the expectations inscribed in an image or an interface, and to offer a counterintuitive if not counterfactual impression that requires a readaptation of the intuitions that usually guide the response to such affordances.'[9] The counterfactual and counterintuitive impressions are to get rid of the shackles of machine-led works. The adaptation of counter-intuition is the contemporary image's response to the images of the past. In the past, the immediacy of the machine as well as its authenticity allowed humans to be informed of the latest developments in society and even vivid history. Whereas today, images seen through machines are not necessarily real, or even entirely computer fictional. In other words, what machines can create for humans is access to different times and spaces. This connection between the present and the past is one of the hallmarks of Anadol's work. In his artificial intelligence data paintings, while we can feel the richness of detail in the work, we also need to think about what the future of painting, in the face of technology, can still do. Thus, the interlocking relationship between machines and humans is not entirely advantageous for artistic creation.

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[8] Broeckmann, A. (2016). *Machine Art in the Twentieth Century* (p. 128). Cambridge, MA: The MIT Press.

[9] Broeckmann, A. (2016). *Machine Art in the Twentieth Century* (p. 153). Cambridge, MA: The MIT Press.

Figure 7: Refik Anadol, MARS Landscapes: AI Data Sculpture

Conclusion

Refik's constructions of space and time show that machines and human perceptions can be blend creatively. His practices enable viewers to perceive how great influence of technology on creations of artworks. Whether artwork or installation, they embody the technical attributes of machines in the contemporary period. The breathtakingly splendid views in open spaces bring audio-visual satisfaction and enjoyment. It is also important to note that overly splendid scenes may pose some negative effects on the artists and the viewers. From the perspective of artists', how to balance the machine with the work becomes a key issue. The artist should not go overboard in the pursuit of the presentation of the work, neglecting the inner expression of the work. Additionally, for viewers, perceptual flooding may make it difficult for them to have a good understanding of their experiences. Rather than a mass-produced body of work, it is important to think about what the work will ultimately bring to the viewer or to society. The art historian Andreas Broeckmann' s book Machine Art in the Twentieth Century explores how machines interact with artworks in the early 20th century. Their interactions and influence are becoming stronger. But we need to admit that the situation poses some dangers. Under the influence of more cutting-edge technology, more vivid and living art creations will be created in the near future. In an age of media saturated with audiovisual sensations, will the work, like a fast-moving product, keep changing and eventually become a testament to its time? It depends on what else the work itself can bring to viewers, and artists, apart from the joy of interaction? How to perceive connections between machines and humans will be an important research direction in the future.

References

Broeckmann, A. (2016). Machine art in the twentieth century. Cambridge, MA: The MIT Press.

Belogolovsky, V. (2022). Refik Anadol tests new possibilities for experiencing digital space. Stirworld.com. Retrieved from https://www.stirworld.com/think-columns-refik-anadol-tests-new-possibilities-for-experiencing-digital-space.

Machine Memoirs: Space. Retrieved from https://refikanadol.com/works/machine-memoirs-space/.

Owens, C. (1980). The Allegorical Impulse: Toward a Theory of Postmodernism. October, 12(67). Retrieved from https://doi.org/10.2307/778575.

Refik Anadol Studio. Retrieved from https://refikanadolstudio.com/.

Anadol, R. (2020), Synaesthetic Architecture: A Building Dreams. *Archit. Design,* 90: 76-85.

Anadol, R. (2022). Space in the Mind of a Machine: Immersive Narratives. *Architectural Design*, 92(3), 28-37.

Broeckmann. (2019). The Machine as Artist as Myth. *Arts (Basel)*, 8(1), 25-35.