CINEMATIC FUTURES: THE IMPACT OF AI ON THE CINEMATOGRAPHY

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Abstract

This article aims to explore the impact of artificial intelligence on cinema, specifically its transformative effects on the art form and contributions to cinematography. Artificial intelligence is expected to accelerate and improve the design process at various stages of film production, from screenwriting software to visual design, editing, music design, scoring, and visual effects. This will help the creative team aesthetically and speed up the film completion process, reducing the film budget. In the near future, it may be inevitable that cinematographers will use artificial intelligence in their creative process. This could include the use of AI to assist the aesthetics and methods established at the scripting stage, and composition, lighting, colour correction. This situation raises serious concerns about the artist's approach.

This study aims to show how cinematographers can benefit from AI technology using the film The Announcement (2017) by director Mahmut Fazıl Coşkun as an example. The method of the study was determined as descriptive content analysis from qualitative research techniques. Since the cinematographic contribution of the cinematographer is to be compared with artificial intelligence in the film, a scene in which the art director, costume designer, and makeup artist cannot use their own original interpretation was specifically selected and processed. Since the film is an adaptation of a real story and reflects a real event, the decor, costume, and makeup really need to be done in accordance with that time, certain scenes of the film were selected and focused on the cinematographer's interpretation, and an attempt was made to recreate and evaluate the same scene using codes written for artificial intelligence.

Key Words: art, artificial intelligence, cinema, cinematography

SİNEMATİK GELECEKLER:
YAPAY ZEKANIN SİNEMATOGRAFİ ÜZERİNDEKİ ETKİSİ

Öz

Bu çalışma, yapay zekânın (YZ) sinematografi alanındaki etkisini ve ortaya çıkan sanatın kimliğini ve sinematografik anlamdaki katkısını incelemek amacındadır. Yapay Zekâ ile senaryonun yazılım aşamasından, görsel tasarıma, kurgulanma sürecinden müzik, seslendirme ve hatta görsel efektlerin oluşturulmasında önemli ölçüde hızlanma ve tasarım desteği vermesi beklenmektedir. Bu, hem estetik olarak yaratıcı ekibe destek verecek hem filmin tamamlanma sürecini hızlandıracak dolayısıyla filmin bütçesini düşürecektir. Görüntü yönetmeninin, yapay zekâ yardımıyla filmi senaryo aşamasında belirlediği estetik ve yöntemle kompozisyon, ışıklandırma, renk düzeltme hatta yapay zekâ yardımıyla tamamlanmış görsel efektler ile ilham verici yaklaşımlarda bulunması ve bunları kullanması yakın dönemde kaçınılmaz bir süreç oluşturabilir. Bu durumun beraberinde getirdiği soruların, sanatçı kavramıyla ilgili ciddi endişeler uyandırabileceği aşikârdır.

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Çalışmada, sinematografın veya başka bir deyişle görüntü yönetmeninin yapay zekâ teknolojisinden nasıl faydalandığı, yönetmenliğini Mahmut Fazıl Coşkun'un yaptığı 2017 yapımı *Anons* filmi ile örneklendirilmeye çalışılmıştır. Çalışmanın yöntemi, nitel araştırma tekniklerinden betimleyici içerik analizi olarak belirlenmiştir. Ele alınan filmde özellikle görüntü yönetiminin sinematografik katkısının yapay zekâyla karşılaştırılacak olmasından dolayı; sanat yönetmeni, kostüm tasarımcısı ve makyözün kendi özgün yorumunu kullanamadığı bir sahne özellikle seçilerek işlenmiştir. Yönetmenliğini Mahmut Fazıl Coşkun'un yaptığı *Anons* (2017) filminin, gerçek bir hikâyeden uyarlama olması, gerçek bir olayı yansıtması nedeniyle dekor, kostüm ve makyajın gerçekten o döneme uygun yapılması gereğinden, filmi belirli sahneleri seçilerek görüntü yönetmeninin yorumlamasına odaklanılmış ve aynı sahne yapay zekâya yazılan kodlarla yeniden yaratım sürecinde birbirleriyle değerlendirilmeye çalışılmıştır. Çalışmanın sonunda, yapay zekânın sanat ve sanatçı bakımından yorumlanmasına çalışılmış ve devam eden süreçte yapay zekânın sanat ve sanatçıya etkisi tartışılmıştır.

Anahtar Kelimeler: sanat, yapay zekâ, sinema, sinematografi

Introduction

In recent years, it's evident that artificial intelligence has permeated all aspects of life. From driverless cars to voice assistants like *Alexa* and *Siri*, it is obvious that this technology is in every aspect of life. The same applies to cinema, where it has already entrenched itself as an essential tool for film crews, especially in post-production. It can also be argued that art and technology have always influenced each other and evolved together, and that with cultural transformations, today's technology has influenced the aesthetics of art and the perception of the artist. In addition, paintings, music, and poems belonging to Artificial Intelligence (AI), in which humans do not intervene, can be produced with this technology (Güney & Yavuz, 2020, p. 416). The same is true for the art of cinema. Asking AI what it can do in Hollywood (Smith, 2023)the following topics were mentioned: Screenwriting, Pre-production, Special Effects, Audience Analysis and Distribution Strategies.

By providing a brief summary of some technical aspects of AI, we can further clarify the purpose of this paper. With AI, perceptual mechanisms, short-term working memory subsystem thanks to world-renowned databases, common sense knowledge, planning ability, actuator mechanism (e.g. speech or robotic emotions subsystem) and reasoning mechanism, sometimes in a near-realistic and sometimes in a fully realistic form, have played an important role in making this technology successful (Fisher, 2001, p. 2). It can be said, then, that the use of this technology in cinema and cinematography will be inevitable. Indeed, popular films such as the *Lord of the Rings* trilogy and the *Matrix* series have utilized AI to bring their fantastical stories to life. Since then, AI tools have become an increasingly integral part of the film industry, with directors using them for tasks ranging from facial recognition technology to script writing. As these technologies become increasingly sophisticated, they will also create new opportunities for filmmakers willing to bravely take on the challenge of exploring what it means to interact with intelligent machines as a society (Chase, 2023).

In this study, taking into account the functions of AI mentioned above, we have endeavored to observe how cinema can be integrated with text-to-visual software like 'Midjourney' and *'Dall.e',* and we have also examined how AI has revolutionized the filmmaking process. Since this may have also changed the preferences of cinematographers, we also tried to draw attention to how cinematographers use these technologies on set.

### 1. About Artificial Intelligence

AI can be viewed as a branch of software engineering, a perspective that is shared by numerous AI practitioners. If knowledge can be encoded into a program, then that program can be classified as an AI program. If AI is associated with intelligent behaviors such as

learning, problem-solving, and decision-making, then it can be regarded as a branch of science in the information network. Many AI researchers strongly believe that AI is rooted in mathematics: The knowledge representations used in AI can be combined with established formalisms and logics that predate these programs. So, is AI psychology? Can creating a complete model of human thought processes and embedding it in a computer be considered a contribution to AI? Many AI researchers assert that artificial intelligence is derived from human intelligence and is designed to function reasonably (Schank, 1987, pp. 59-60). Current technological and scientific progress is increasingly dependent on three technologies: biotechnology, information technology and nanotechnology. The idea of integrating bioscience, AI and nanotechnology would foster another revolution in science and technology, which has been underway for more than a decade. However, the planned integration of multidisciplinary research is still evolving (Bhargava & Sharma, 2021, p. 1). AI research operates on the premise that the learning process can be formalized. Artificial intelligence is known to be utilized in numerous fields, including medical diagnosis, business management, online recommendation systems, automatic target identification for military weapon systems, financial forecasting, unmanned vehicle control systems, and smart home applications.

The term "Artificial Intelligence" was first coined by Turing, John McCarthy, and Marvin Minsky in 1952 when they conceptualized a machine capable of executing tasks typically associated with human intelligence. In 2016, the world of technology witnessed a significant shift when *Google* announced that its *AI, AlphaGo,* had defeated the world champion in the game of *"Go"*. *Go* is a simple game that requires strategy and intuition, traits usually attributed to humans. In 2017, IBM Watson beat Jeopardy. Watson can answer questions faster than previous AI systems, showing that computers can now think faster than humans. However, AI has yet to generate original ideas or solve new problems on its own. Again, in 2018, Microsoft's Tay chatbot went online with an AI program called Zo, used Twitter as a source of information, and through interactions with users learned what topics are interesting and not interesting to people online today, so it could tailor its responses accordingly.

Since 2018, AI has manifested in various forms in the realm of painting. A painting by AI, (Generative Adversarial Network), with a signature thought to be interesting, was sold at auction for 432,500 USD.

Image 1. "Portrait of Edmond Belamy" 2018, sold for $432,500 USD on October 25, 2018 in New York, Painter: GAN (Generative Adversarial Network)
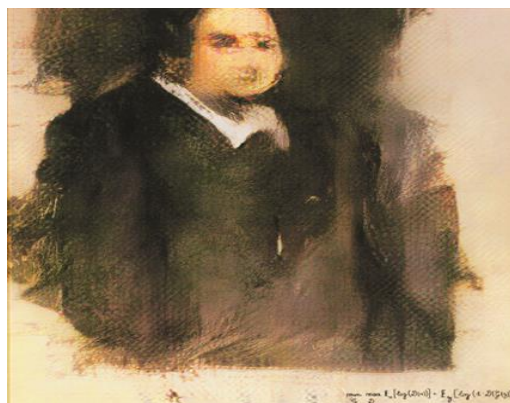
Through this painting, AI seeks to illustrate its potential to emulate human creativity. However, it remains uncertain whether such computer software will be available to the public within the next five years, either for a nominal fee or completely free of charge. Today, from painting to music, from storytelling to scriptwriting, it can be said that AI's work has become indistinguishable from that of real artists. This can be tested by readers at *http://aiorart.com/*. Furthermore, via *"Prompt Engineering"*, a method of interacting with artificial intelligence, AI can now generate desired paintings, music, or written works. With this capability of AI, its use in every field of cinema has become inevitable. Since the main subject of the study is the relationship between *"AI"* and *"Cinematography"*, how exactly this can be done with the help of AI and who is the artist in this case is the subject of discussion. It can also be seen that the results obtained by AI in cinematography today are close to perfection.

2. A Brief History of Cinematography

While the term 'cinematography' literally means 'writing motion' ('graphia' meaning 'writing' and 'kino' meaning 'motion'), it has come to signify the recording of moving images. The first machine capable of this was called a kinetoscope, which could only display its images to one person at a time through a viewfinder. In 1895, the Lumiere brothers in France invented the 'Cinématographe', a machine capable of both recording and projecting images. In 1900, the French Gaumont company began marketing the 'Chrono de Poche', a portable camera using 15 mm. film with a single hole in the center, and two years later the Warwick Trading Company in England introduced 17.5 mm. film for amateurs, designed to be used in a machine called the Biokam, which (like the early Lumière machines) doubled as a camera, printer and projector, and this was adopted in the 1920s by Ernemann in Germany and then Pathé in France (Usai, 1996, p. 33). Instead of adopting a new term, the public preferred to use the term 'camera', derived from 'camera obscura', the name of the darkroom where the first camera was named. Consequently, the person operating the camera came to be known as the 'cameraman'. This new technological invention was initially seen as a form of entertainment, primarily used for documentary purposes. The evolution of this entertainment medium was shaped by the involvement of theater groups, transforming it into a tool for propaganda and an artistic discipline. In the early period of cinema, slapstick comedy was the genre that saw the most success in short films. While a successful transition to the feature-length format was made with Charlie Chaplin and Buster Keaton, in the early 1920s, most of the silent comedians, including Stan Laurel and Oliver Hardy, built their silent careers almost entirely on short films and comedy (Nowell-Smith, 1997, p. 29). During this period, directors guided actors and staged scenes much like in theater, the predominant form of entertainment at the time. Meanwhile, cameramen were responsible for positioning the camera and capturing shots based on the optimal lighting conditions.

Historically, cinematography has been significantly constrained by technical limitations, including lighting, camera equipment, chemical processing, and color settings. The earliest film colors appear to be hand colored. An astonishing example of hand coloring can be seen on a print of the Edison Manufacturing Company's *"Serpentine Dance"* at the British Film Institute (BFI), probably dated 1895 (Misek, 2010, p. 15). It is also noteworthy that with the advent of digital cameras, the film washing laboratory has almost completely disappeared and new professions such as *'color designer' have emerged* in the digital world, and with this development, the technical work of the cinematographer has been considerably divided and lightened. In general, with these developments, it can be considered that it has become much easier to create impressive cinematographic works in recent years than in the past.

It is obvious that with today's technology, it is much easier to make previously unimaginable camera movements such as lenses that can enter through a doorway, 'drones' that can fly out of a building window and fly for kilometers with acrobatic movements, underwater cameras and so on. In the 1975 movie Barry Lyndon, Zeiss's Planar 0.7/50mm was requested from NASA to use the most open-aperture lens up to that day so that Kubrick and John Alcott could shoot by candlelight. Only ten of these lenses had been produced fifty-one years earlier, six of which were specially made for NASA. When the lens was delivered, it was adapted to the Mitchell BNC (Blimped Noiseless Camera) using a Kollmorgen adapter designed by Ed Di Giulio. This camera caused a sensation when it was released in 1934, and films famous for their cinematography, such as Citizen Kane (1941), were shot with this camera (Kuss & Schuerholz, 2022). They had to use this camera because it was the only camera with a variable shutter. The Zeiss Planar has a Compur shutter and it was also considered to be strobed. Ed Di Giulio replaced the variable shutter on the Mitchell with a single-blade shutter, closer to the film layer. All this engineering and communication with NASA could only have been done by a famous director like Kubrick, and yet he had to use a thirty-nine-year-old camera for the candle scenes. ARRI 35BL camera was used for all the rest of the scenes (Visual Memory, 2022). All of the candle scenes were shot using a Zeiss f0.7 and Mitchell BNC camera, but despite the 0.7 aperture lens, the luminance of normal candle lights proved to be insufficient because the negative film with the highest light sensitivity of the period was EI100. Since Eastman Color Negative 100T 5254/7254 is a tungsten balanced film, a special type of candle that illuminates much more than normal and dozens of them had to be used. In some scenes, the candles inside the frame were not enough, and dozens of candles were lit from outside the frame to supplement the light (Kuss & Schuerholz, 2022). Today, even for an amateur camera, lighting with a match has become sufficient for exposure. In the same way, it is conceivable that lighting devices are now available for everyone to buy, and with the advancement of technology, all technical limitations will disappear, changing the way the team does its work.

Cinematography can also be called the art of transforming text into visuals using the elements of dramaturgy. It is also possible to list the elements that make up cinematographic dramaturgy under titles such as idea, theme, composition, subject and material (Aslanyürek, 1998, p. 85). A script is a text that shows what the audience will see and hear in the order in which it will appear on the screen (Aytekin & Eroğlu, 2014, p. 15). Today, with the help of AI, scenarios can be created scene by scene and references can be taken from the resulting examples. While in the past, references were taken from paintings, other films and even photographs, today, with the addition of AI to film technology, it can be seen that a new model has emerged that can translate text into visuals thanks to its contribution to cinematography and artist identity.

3. The Role of Artificial Intelligence in the Film Industry

The role of AI in the film industry has expanded significantly in the last decade. AI can also be seen to be used in film production to assist in pre-visualization, lighting simulation, color palette creation, visual effects and art production.

Pre-visualization is an important component of modern filmmaking, allowing cinematographers and directors to plan scenes before they are shot on set or on location. There are many different tools available to create these pre-visual shots, including storyboarding software such as 'Storyboard Pro', which allows users to create animated sequences using their own images or those found online. 'Shot Designer' is another tool that uses machine learning algorithms to create moving camera paths for any scene. 'Cinemachine' offers similar functionality, but it also includes editing capabilities. Thus, scenes can be created and even edited in real time with a computer at home.

Lighting simulation is a technique used in filmmaking to visualize the lighting of a scene before shooting. With the help of AI, the script can be pre-visualized, creating each scene step by step. The images obtained can be taken as reference. Color grading, which should be done after lighting, is the process of changing the color and lightness of an image. It is used to make an image look better or more natural or to make it look more realistic. The ability to accomplish all these tasks with AI today has opened up a discussion about the role of AI in the artistry of filmmaking. In this context, it can be argued that AI behaves like a real artist.

3.1. Artificial Intelligence and Visual Effects (VFX)

It is fair to say that the use of visual effects has become an integral part of the film industry today. The issue arises when VFX, while capable of creating incredible shots that convince audiences of what they're seeing on screen, sometimes fall short, thereby losing their appeal. This often prompts filmmakers to explore ways of reducing CGI (Computer Generated Images) usage, while still maintaining a degree of realism in their films. CGI is the creation of still or animated visual content with imaging software. CGI is used to produce images for many purposes, including visual art, advertising, anatomical modeling, architectural design, engineering, television shows, video game art and movie special effects, as well as augmented reality (AR) and virtual reality (VR) applications (https://www.techtarget.com/, 2016). It's plausible to suggest that the advent of AI may alleviate these aesthetic concerns. Many people may not be aware of how much work goes into creating the beautiful worlds that appear on screen; they may not know that extensive planning is required before shooting begins in order to use visual effects in a movie. In this context, everything may seem believable when a favorite TV series or movie is watched strictly for entertainment (or educational) purposes, devoid of aesthetic scrutiny. Computer-generated imagery (CGI) is a form of animation that uses computers to create images, usually to simulate a natural scene or create an imaginary world. CGI can be used instead of special effects in cinema. It is evident that computer graphics, compositing and animation programs have become increasingly sophisticated since their inception and many films are left entirely to CGI for their special effects (SFX). CGI (Computer Generated Images) is used to create any object or character that appears on screen, whether real or imaginary. For example, if a fantasy character is wanted in a movie, but there is no actor who can convincingly portray him or her, no make-up artist who can do his or her makeup, and no budget for props, a character can be created using CGI instead. No longer relying on the old frame-by-frame drawing method, CGI can now be created in seconds, utilizing methods such as fill-in-the-blank and image completion, among countless others. It can be asserted that, with AI technology, everything imaginable is now being realized at an unprecedented speed.

3.2. Virtual Studio

It's apparent that traditional design studios, especially since the early 1990s, have undergone significant transformation in line with technological advancements. As communication and computer technology evolved, the transition to Virtual Design Studios (VDS) that eliminate spatial and temporal boundaries has been evident (Kandemir & Ulusoy, 2021, p. 38). A virtual studio can be described as the utilization of Computer-Generated Imagery (CGI) in the backdrop to create an illusion of reality in a film or television program. It is employed for creating a wide range of visual effects that would be challenging or expensive to reproduce in real life, such as large crowds, natural disasters, and explosions. With the advent of AI today, these types of images can be created with remarkable ease.

4. On Cinematographic Expression

In its simplest definition, this term can be regarded as 'the art of visualizing text'. The distinction between this and painting a story lies in the fact that while a painter works alone, a cinematographer operates with a substantial team. Even with the same crew, the same

script, identical locations, and even cinematographic references, a change in the cinematographer can dramatically alter the entire film's cinematography.

Cinematographic narration can be demonstrated through creating the character's personality and mood visually, along with presenting the reality of the scene, such as its day-night cycle and setting. "Cinematic Storytelling" is a term that encapsulates the practice of utilizing moving images to help the audience immerse themselves in the narrative. This approach entails relying on images to carry the story's weight, essentially serving the narrative with the camera. Moving images are present not merely to record performances, but also to convey them to the audience in a way that clarifies and enhances their meaning. Images cannot exist independently as a flashy sideshow or a mere visual decoration. They have the capacity to provide information about the story, and the conventions of the film can facilitate their comprehension. Their role is to aid in narrating the story and to help the audience experience the unique and distinct essence of the story (Robotham, 2022, p. 1). Cinematic storytelling is at the service of dramatic interpretation but it may not be able to substitute it. When expository and inferential story information is combined with a presentation rich in context that delivers both, it helps the audience to feel the narrative without needing conscious thought or without disrupting the flow of emotional responses (Robotham, 2022, p. 198).

a) The Formation of Cinematography in a Film

The first challenge in the emergence of a feature film could be the script stage, where the world and character depictions first appear. This technical text-based story is interpreted by the director, the art director, and the cinematographer, and in many cases, by the visual effects artist to be adapted to the screen. The script experiences a mental convergence in the director's axis through individual depictions and interpretations, and the abstract form of the film is first visualized in the director's mind. Acting as a conductor, the director not only ensures that the actors play in the same tone and style, but also manages the creative teams such as costume, cinematography and art direction to meet in the same style. This process can be considered to begin with the script readings.

The director, cinematographer and art director may have different ways of creating the visual world of the film/picture. While the director portrays the setting of the scene down to the actors' faces and facial expressions, the art director portrays materials such as decor and costumes. The cinematographer brings to life aspects like the composition, perspective, color palette, and type of light. All this animation is the basic scenario and it is not possible to disrupt this basis. For example, if the scenario is in the realist drama genre and the scene requires a location to be illuminated with candlelight as the key light, the cinematographer can change its color from white to red, but cannot use a blue light as a key. As a lighting technique, it points to the fact that the environment cannot be used brightly as in 'sitcoms' and that it is obligatory to use the contrast required by the script. In all areas not conditioned by the script, the cinematographer can shape the cinematography as he or she wishes within the limits of the team and the budget. After reading the script, the cinematographer begins to create the image by interpreting the atmosphere and characters, and by determining the composition and lighting in accordance with the dramatic elements established by the director. Then, considering the requirements of the script such as locations, time of day, and lighting conditions, they will decide how to use them to best support the story. They have to work with the director, art director and costume designer to choose the right camera angles, speed, sensor type, lenses, lighting devices and all other technical equipment to create the desired visual style. Otherwise, the cinematography of the film may suffer from a clash of styles. Therefore, the experience and technical skills of these four, as well as their good communication with each other, can be an important factor in successful cinematography.

The cinematographer uses their knowledge of film techniques, lighting, color and composition to create images that evoke, express and support the story. Whether natural or stylised, he uses his experience and creativity to create the visual and how to create the atmosphere to bring the story to the screen. As an example of this, during a meeting with the director, art director and cinematographer about the visual style of the film during the pre-production of *The Announcement*, the art director Lazso Rajk showed Edward Hopper's 1942 painting Nighthawks as a reference for the visual style of the film, and it was approved by the creative crew (Personal Communication, *The Announcement* Film Meeting, June 2016).

Image 2. Nighthawks Painting, Edward Hopper, 1942

The first step in breaking down a script for cinematic storytelling is to mark the main beats and define the main stages of the scene. This defines the general shape. We will use breaking it down into stages as a way to reach two goals. The first is to understand the scene in general terms. The second is to break the task into manageable segments (Robotham, 2022, p. 200) .

5. Method

'The Announcement' (2017) has been chosen for the study conducted to track and infer the integration of AI with cinematography and to analyze AI within the context of art and the artist through a film. The study employs a qualitative methodological approach. In qualitative research, the subject analyzed can be examined in more depth than other research designs (Patton, 2014). In this context, the relationship between AI and cinematography was examined in a descriptive framework based on the movie *The Announcement* based on the relevant literature. The objective of descriptive research is to present an accurate depiction of the world as it is. (Remler & Van Ryzin , 2014, p. 69) descriptive research can be purely descriptive or comparative (Grove, Nancy, & Jennifer, 2012). The images examined in this study were generated by artificial intelligence through commands, and attempts were made to draw in-depth inferences through analysis. As Giarelli and Tulman (2003) state, since textual images offer direct access to events, the conceptual connection between social phenomena and social objects is crucial; inferences about the subject matter are drawn by establishing conceptual links between the social context, the visual text, and theoretical assumptions.

6. Findings and Interpretation

In the study, frames from the film *'The Announcement'* (2017), which was selected as an example, were chosen, and initially displayed in their original form. Subsequently, these same images were attempted to be regenerated by AI using commands. This approach enabled the provision of information about the similarities and differences between the real

image and the image produced by the AI, and their production processes. The scene in the image provided below takes place at night in TRT radio house in 1963.

Image 3. An Image from the movie Announcement

The screenplay of the film, written by the director himself, describes this eight-second, dialogue-free shot as follows:

SCENE 18. (INTERIOR/NIGHT) TRT RADIO HOUSE

Meanwhile, Osman Colonel *and Şinasi are waiting at the entrance of the radio house* (Coşkun, 2017).

When this mise-en-scene is analysed, the TRT radio house in Harbiye, Istanbul, whose architecture was designed by Doğan Erginbaş, Ömer Güney and İsmail Utkular, was used as a location instead of a set. As the location is historical and real, the art direction was applied only at the accessory level. The primary reason for this might be that a set - particularly if it's a historical location - cannot quite replace the reality. Moreover, it would be quite costly to perform aging work over a long period to provide historical texture. A significant disadvantage of using a real location might be the inability to set up lighting platforms necessary for illuminating the scene. In other words, while using a real location might seem advantageous from a budgetary and art direction perspective, it could limit the uniqueness of the art director's interpretation. Real locations (streets, surrounding areas) are generally noisy for sound recordings. Even in the middle of the city, sound recordings can be better performed in the studio thanks to sound isolation. For the cinematographer, lighting in a real location can become more challenging. Indeed, while the ceiling heights on set exceed nine meters, in real locations it often remains under three meters. This can lead to a need to light from angles not visible to the camera due to the light entering the frame when hung from above. With the advancement of technology and the increase in camera light sensitivity, those shooting in real locations have made lighting possible by using the location's own lighting, referred to as 'practical'. In this scene, due to the film being an adaptation from a real story, the Turkish officer's uniform in 1963 had to be sewn identically, limiting the scope for original interpretation in costume design as well. Thus, in the cinematography of the scene, the remaining elements open to artistic interpretation are lighting and composition.

In the given shot, a portrait of a soldier attempting a coup is seen. Here, a lighting technique can be applied technically according to the location and time of day. This mechanical lighting technique can be used in every scene of every movie. Especially in productions where budget or time is limited, the technique that does not include the artist's

interpretation and adheres to reality can often be used. It can be seen in the example scene that they did not settle for technical lighting but designed it by determining a style.

In terms of composition, the character has been placed near the center of the frame on the right side, and is particularly lit. His leaning against the door can suggest he is surveilling both inside and outside, and his presence from the bottom to the top of the frame, along with his face being placed in the upper part, can enhance the sense that the character is confident and strong. At the first glance at the frame, due to being near the center and bright, Şinasi's (the character's name in the film) face, and right after his cap and uniform are perceived. As he is holding his gun towards the direction of the light, the object made of black metal stands out by shining without merging with the uniform. This emerging sense of danger might be included in the composition for tension. The light hitting the wall, which is the backdrop of Şinasi, separates him from the wall. The cinematographer used a very soft Rim light to bring out the actor's outline. In addition, he separated the actor from the backdrop with lighting and achieved a three-dimensional composition with light and perspective. Technically, it is known that Rim light is used to separate the actor or object from the backdrop. However, perceptually, this Rim light is used more to highlight the actor, but since it creates a sense of goodness related to the object or character, its suitability for this character in cinematographic terms is debatable. He divided it in half as bright and dark using lateral light. He displayed the character's hardness and the contrast of the situation he is in. Along with this, using a fill light, the texture of the cheek left in shadow was revealed and the perception of contrast was weakened. There could be several reasons for using lateral light; to understand these reasons, it is necessary to define lateral light.

Image 4. Formation of Lateral Light in Cinematography
(Created by the Author)
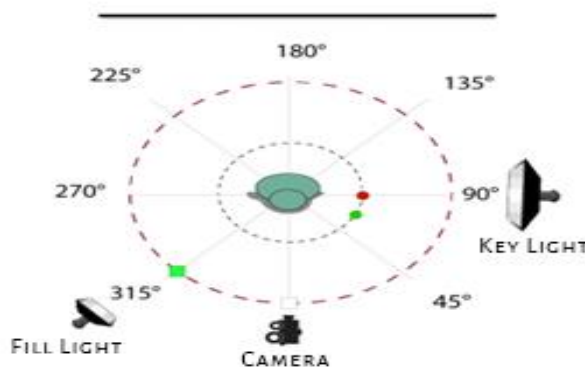
In lighting, sidelight (or lateral light or split lighting) is defined as the positioning of the key light that illuminates the center of the composition at approximately 90 degrees in relation to the camera. The angle of sidelight doesn't change according to the angle of the actor or the object in the center of the composition; merely being 90 degrees in relation to the camera is technically enough to categorize it as sidelight. This lighting technique is commonly used to introduce contrast to the image and to bring out tension in the composition. Additionally, sidelight is favored for creating depth, generating a three-dimensional impression, and establishing a dramatic atmosphere, among other reasons.

Alongside the direction of light, another critical factor is the hardness and intensity of the light used. Hard light is usually obtained from narrow-angled lamps (such as spotlights

or parabolized aluminum reflector lights) to create more drama or mystery. Soft light (reflected light, softboxes, Fresnel lamps with diffusion filters) is used to highlight more natural or textural qualities.

The intensity of light refers to how much it illuminates from one side of the scene to the other. Although it is similar in concept to the hardness of light, unlike hardness, it is independent of the lighting angle of the lamp.

A type of key light that is very similar to side light in terms of direction and appearance, but given at around 70°, is called 'Rembrandt Light.' The perception of this light is different from side light. It doesn't divide the face in half like sidelight but shadows a significant part of the second half of the face. The hardness of the contrast in the light is proportional to the amount of fill light. The critical difference is the Rembrandt Triangle, which is physically small but carries significant emotional and detailed meaning. While side light gathers the perception on one side of the face, Rembrandt light focuses the perception on the actor's eyes, which allows for faster empathy building with the actor. It can help understand what the character is thinking, increase emotionality, and give a more natural feeling. The harshness of the scene in the script is balanced with fill light in cinematography. If the cinematographer intends to beautify a female actor using this technique, they will increase the fill to achieve a softer light. Otherwise, even if the fill light is not used at all, empathy can increase, but the perception will be focused on what the character is thinking, not their beauty. In summary, with this lighting technique, objects in the foreground are illuminated, and areas in the decor where particular attention is desired are highlighted, directing the viewer's attention towards the object in the foreground (Sözen & Dayı, 2013, p. 41).

Image 5. Rembrandt's Self-Portrait 1660 and Portrait of a Young Woman - Rembrandt (1660)


A contrasting lighting technique to Rembrandt lighting in cinematography could be considered 'flat lighting.' This technique provides a less dramatic and shadowed appearance of characters and scenes, which may facilitate empathy with the audience. The key point here is that the cinematographer, unlike the art director and costume designer, is quite different from reality in that he uses a light that looks realistic but in fact, given the years in which the story takes place, it doesn't exist at that time. The period depicted in the movie 'The Announcement' is 1963, during which interior lighting was predominantly done with incandescent filament lamps. These lamps had a color temperature of around 2500 Kelvin, providing a very warm color range. Tungsten lamps, introduced in the 1950s, differ mainly in being brighter and having a color temperature closer to 3000 Kelvin..

Image 6. Light Intensity
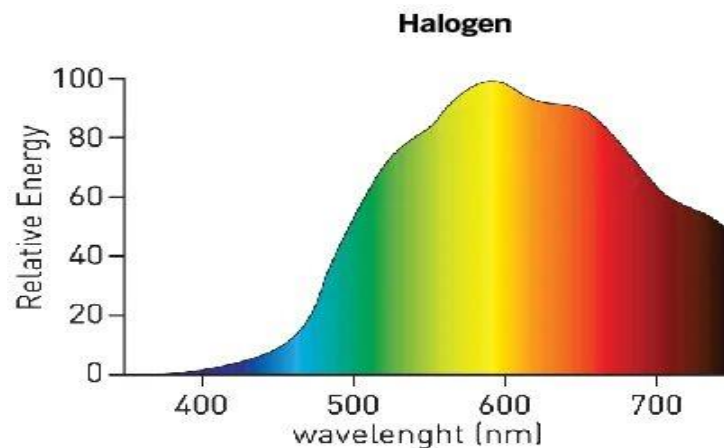
In physics, flux is defined as the measure of the number of electric or magnetic field lines that pass through a surface within a certain period of time. In this context, it could be referred to as light intensity. For halogen lamps, it can be stated that as the temperature rises, the Kelvin value increases, which in turn causes a shift towards white and an increase in brightness due to the expanded area within the visible spectrum. Whether incandescent or Tungsten, from either perspective, the light reflected from the inside onto the wall exhibits almost blue tones. As a result, it can be inferred that the lighting used in this scene of *'The Announcement'* is not representative of the period depicted.

On the stage, the stark light streaming in from outside the door is observed to be a simulation of a streetlamp. During the era depicted in the script, street lighting was commonly provided by low-pressure sodium-vapor lamps.

Image 7: Chart Shows Sodium Lamp Has a Narrow Spectrum
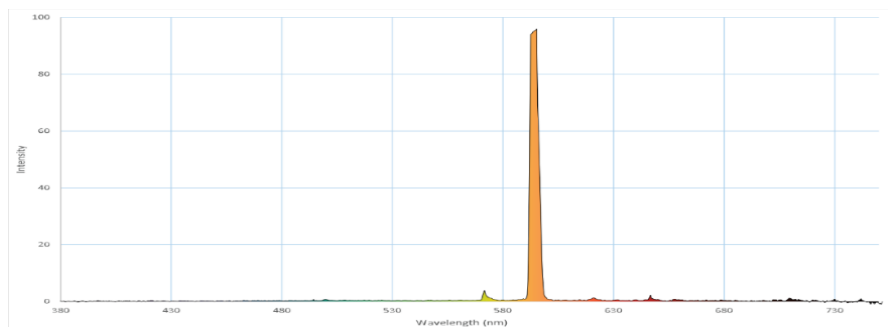
As observed here, this sodium lamp possesses a quite narrow spectrum, ranging between 589-595nm, rendering it a vividly red monochrome orange. However, the light emanating from outside in the scene exhibits a yellow hue, closely resembling white. This suggests that the cinematographer opted for an aesthetic approach rather than rigidly adhering to historical accuracy regarding lighting. This creative liberty could be viewed as an original interpretation that enhances the flow of the scene without compromising its believability or alienating the audience.

The sentence provided above and taken from the script was requested to be interpreted by AI without giving too much detail using the following commands: *soldier*

guarding the entrance of building inside, watching the street through the window of the gate holds a Sten long-barreled gun, inside, night, 1963 building, ultra-realistic, octane render --ar 3:2 --v 4 --q 5 --s 200

Image 8. AI's Photo Generated by Codes

Although the AI generated a distinct texture visually due to lacking information about the TRT radio house, it can be observed that it managed to visualize the text with the same intensity as it portrayed a fully equipped soldier with raised arms. Since the AI lacks specific details such as location information and the director's mise-en-scene, it may have delivered results that don't align with the scale and perspective the director might desire for the editing process. However, upon seeing such a visualization during the preparation stage, the director could adjust the scene's scene to tailor the edit accordingly.

When examining the cinematography of the image generated by the AI, it's clear that the exterior light is too potent to be moonlight. Hence, just like the cinematographer's interpretation, this visualization may be purposely deviating from the sodium lamps used for lighting in that era. The hue selected by the cinematographer, being yellow-white, appears as somewhere between white and blue in the AI's rendering. It is also evident that the incoming blue tone from outside establishes a chromatic contrast with the tungsten tones inside.

The AI preferred to depict the soldier from a much wider shot, with the characters back turned. It positioned the character not directly in the center of the frame, but rather in the lower-right quadrant. The AI applied a harsh RIM light, making him the first perceived object despite his back being turned. Intriguingly, this choice deviates from the director and cinematographer's preference for the strong soldier model. Instead, in this scene, the character Şinasi, overwhelmed by his surroundings, is positioned to oversee both internal and external threats, safeguarding the building entrance. Consequently, the director was asked to re-run the output, integrating details about the scene and lighting directions into the following command: *hard looking soldier::1 holds a Sten long-barreled gun::1 leaning against the glazed entrance gate::4 looking through the window::4 rainy night::2 cinematic::1 wide angle::2 style of Roger Deakins::4 --ar 3:2 --v 4 --q 5 --s 200*

Image 9. Photo Received with Detail Code

Given that no information about the axis was provided, the door was placed randomly to the right of the frame, yet the new outcome closely resembles the actual filmed scene. Considering this command was given during the initial preparation stage, a preliminary visualization could potentially be created, substantially accelerating the film's pre-production phase and enabling concrete visual references for aesthetic discussions.

The discrepancies in the decor and the weapon held are attributable to the absence of such details and references within the command. The objective here is not to have the AI direct the film, but rather to gain inspiration or develop a stylistic approach by converting the screenplay text and its depictions into command line language that the AI can interpret. When necessary, distinct camera angles, types of lighting, colors, and practical lighting can aid in determining the light's position in the frame, clarifying the actor's position within the composition, and even establishing their specific stance. If the resulting image is deemed noncontributory to the film, the plan can be dismissed, thereby expediting the filming process by eliminating unnecessary scenes or shots.An example of a new method, currently in its experimental phase, which could fall under the category of post-shoot visual effects compositing—entirely undertaken by artificial intelligence—is provided below, using an image from the conclusion of *'The Announcement'* film.

Image 10. Original Video Format of the Movie *'The Announcement'*

In the original scene, soldiers depart from the TRT Radio House at dawn and enter a taxi. The frame is only wide enough to encompass five actors. The windows on both sides of the vehicle and the buildings beyond them fall outside of the frame. Buildings that appear blurred in the background do not pose an issue due to their unidentifiable nature, but such a scale may have been selected due to the lack of period-appropriate structures at the focus point. This frame was expanded via Dall.E, an AI tool developed by OpenAI, resulting in the image shown below.

Image 11. Changes to the Image Format (aspect ratio) of the Film *the Announcement* with AI

If attempted using conventional methods, this expansion would involve the following steps: 1 - Modeling and rendering the car by a 3D designer, 2 - Modeling and rendering the actors' arms by a 3D designer, 3 - Designing the glass with dust particles and a trace image, 4 - Capturing the VFX footage (plate) that will appear behind the glass.

A VFX artist must then integrate all these visuals and ensure color consistency. Such a task could take several days to complete; however, utilizing AI allowed for its completion in mere seconds.

Employing this approach, transitioning a close-up to a medium shot—and potentially even to a wide shot in the future—could be achieved much quicker and at a lower cost compared to traditional VFX processes.

Until the late 2000s, location scouting preparations were conducted using a director's viewfinder, an optical device fitted with real lenses to define angles, and a compass. With the advent of smartphone applications such as Cadrage, Sunseeker, and pCAM in the 2010s, these traditional tools have largely become obsolete. Furthermore, certain formulas, like light intensity-distance calculations that are integral parts of cinematography courses in prestigious film schools like VGIK, have largely been forgotten due to these technological advancements.

This digital takeover can be viewed as a significant technological progression, and initially, it seems to pose no ethical issues. However, with the advent of AI-assisted art studios that generate samples of how shooting should be done in the pre-production and design phase, the differentiation between a human artist and an AI becomes blurred. This transition brings the debate about the authenticity of an artist's identity into sharper focus. While AI may not entirely replace artists, it's plausible that artists who effectively utilize AI and other computer software may demonstrate "superior skills." The incremental adoption of AI in the artistic process could encompass the following areas:

a) *Pre-visualization of Scenes:* Cinematographers can employ AI to generate pre-visualizations of scenes, enabling them to experiment with diverse camera angles, movements, and lighting configurations prior to actual shooting. This can enhance informed decision-making about a film's visual style and technical components. Collaborations with the director and art director could further streamline stylistic choices.

b) *Lighting Simulation:* AI-enhanced lighting simulation software can model various lighting scenarios and settings, offering cinematographers the chance to try out different lighting arrangements and preview their impact on the final image.

c) *Color Palettes:* AI-supported color software can be used to enrich the film's visual style and mood. This software can conduct color analyses based on the script and create a robust reference by crafting a unique look.

d) *Content-Aware Image Rendering:* AI can extend the field of view in post-production, mimicking a wider angle shot than was initially captured. This could rectify continuity issues in the editing process.

e) *Object Detection and Tracking:* AI-supported object detection and tracking software can automatically identify and track specific objects or characters in a scene, facilitating cinematographers' planning of camera movements and shots.

f) *Automatic Shot Matching:* AI can be utilized to analyze two distinct shots and automatically align the framing, composition, and camera movement of one shot with the other, easing the planning and execution of intricate shots for cinematographers.

It's crucial to emphasize that AI serves as a tool and is not a substitute for a cinematographer's creativity, artistry, and expertise. However, it can augment and streamline their work by enhancing efficiency and offering a broader range of options for the creative process.

Cinematography involves the utilization of technology and techniques to construct a visual representation of a script. Given that cinematography entails the interpretation of a script's dramatic elements through camera angles, lighting, color, and composition, these techniques can be tailored by the director to their vision for each scene and sequence. This ensures a consistent tone and mood across the work of other designers involved, including the art director, costume designer, makeup artist, and hairstylist. This collaboration yields a cohesive visual narrative or cinematography. The distinct feature of this artistic endeavor, compared to painting, is that it's a collaborative process. Therefore, AI, especially in facilitating the tasks of producers, can considerably simplify this complex process.

Conclusion

The role of artificial intelligence (AI) in the film industry has been a topic of advancement for many years. It is no secret that AI has already left a significant impact on the cinematic world. Nonetheless, the implications of this development for the future of cinematography remain a subject of debate. The answer to this question largely depends on one's perspective on AI's technological evolution and its effect on the industry. There are two primary schools of thought. One group believes that AI will transform every facet of filmmaking as we understand it today. On the contrary, others postulate that while these emerging technologies may initially prove beneficial—especially when integrated with traditional methods—they will not bring about any revolutionary changes in the long run.

Regardless, the journey of computers in the cinematic world from their inception as mere typewriters and advanced calculators has undeniably been significant. Numerous technological advancements have taken place in the film industry, yet AI could arguably be the most impactful among them. With the deployment of AI and machine learning algorithms, filmmakers now have broader opportunities to generate superior designs and visual effects. Presently, the term 'artist' is an attribute designated to humans. However, no compelling argument exists to denounce an AI-produced piece of music or art as "not art" merely because it employs algorithms in lieu of organic learning methods. This is primarily because AI has demonstrated its ability to create works that even the most accomplished artists consider to be human made.

Genişletilmiş Özet

Bu araştırma, yapay zekânın (YZ) sinematografi alanındaki etkisini ve ortaya çıkan sanatın kimliğini ve sinematografik anlamdaki katkısını incelemek amacıyla tasarlanmıştır. Çalışma, yapay zekânın sinema endüstrisindeki rolünü geniş bir perspektifle ele almaya

çalışmış ve bu teknolojinin film yapım süreçlerine nasıl bir katkı sağlayabileceğini araştırmıştır. Sinema sanatı ve yapay zekâ arasındaki etkileşime bakıldığında; yapay zekânın senaryo yazımından görsel tasarıma, montajdan kurgulanma sürecine hatta müzik, seslendirme ve görsel efektlerin oluşturulmasına kadar film yapımının hemen hemen her aşamasında kullanılabilecek seviyeye yaklaştığı kabul edilebilir. Çalışma, yapay zekânın estetik ve teknik olarak yaratıcı ekibe destek olmasını, filmin tamamlanma sürecini hızlandırmasını ve bu sayede filmin bütçesine olumlu etkilerini ele almıştır. Ayrıca, yapay zekânın sinematografi alanındaki kullanımı, görüntü yönetmenlerinin estetik ve yöntemsel yaklaşımlarına nasıl katkıda bulunabileceğini ve bu sürecin sanatçı kavramı üzerindeki potansiyel etkilerini de tartışmıştır. Bu bağlamda, yönetmen Mahmut Fazıl Coşkun'un 2017 yapımı "Anons" filmi örnek olarak alınarak, sinematografın veya başka bir deyişle görüntü yönetmeninin yapay zekâ teknolojisinden nasıl faydalanabileceği üzerinde durulmaya çalışılmıştır.

Bu çalışma, Yapay zekanın sinemadaki etkilerini ve bu teknolojinin sinematografi sanatına katkılarını araştırmayı amaçlamıştır. Yapay zekanın, senaryo yazımından görsel tasarıma, müzik ve görsel efektlerin oluşturulmasına kadar film üretiminde önemli bir hızlanma ve destek sağlaması ve her geçen gün bu hızı artırması beklenmektedir. Yapay zekanın estetik ve yöntem açısından senaryo aşamasında yardımcı olabileceği ve sinematografların yaratıcı süreçlerinde yapay zekayı kullanmalarının kaçınılmaz olabileceği de çalışmada ayrıca ele alınmıştır. Çalışma, nitel araştırma tekniklerinden betimsel içerik analizi yöntemi kullanarak gerçekleştirilmiştir. Çalışmada, Mahmut Fazıl Coşkun'un yönettiği 2017 yapımı *"Anons"* filminden alınan örneklerle, sinematografın yapay zekâdan nasıl yararlanabileceğine dair örnekler sunulmaya çalışılmıştır. Bahsi geçen filmin belirli sahneleri rastlantısal olarak seçilmiş, görüntü yönetmeninin sahneyi ve figürü nasıl yorumladığına odaklanılmış ve aynı sahnelerin yapay zekâ kullanılarak yeniden yaratılması deneyi kodlarla birlikte yapılandırılarak benzer şekilde yeniden resmedilmeye çalışılmıştır. Yapay zekanın özellikle aydınlatma ve kompozisyon açısından sinematografik süreçlere nasıl katkıda bulunabileceği bu araştırmanın temel amaçlarından birini oluşturmaktadır. Yapay zekânın, sinematografların yaratıcı süreçlerine katkı sağlayabileceği, ancak insan sanatçının yerini alamayacağı sonucuna varılmıştır. Yapay zekânın sinematografide kullanımının, sanat ve sanatçı kavramları üzerindeki etkilerinin devam eden bir tartışma konusu olduğu bu çalışmada ayrıca belirtilmiştir. Yapay zekânın sinema endüstrisinde önemli bir rol oynadığını ve bu teknolojinin sanatçılar ve sinematografik süreçler üzerinde nasıl bir etki yaratabileceğini detaylı bir şekilde incelemektedir. Yapay zekâ, sinema dünyasını dönüştürme potansiyeline sahipken, insan sanatçının yaratıcılığı ve duyarlılığı ile birleştiğinde sinematografinin geleceğine önemli katkılarda bulunabilir. Çalışmanın asıl konusu *"YZ"* ve *"Sinematografi"* ilişkisi olduğundan tam da bunun Yapay zekâ yardımıyla nasıl yapılabileceği ve bu durumda sanatçının kim olduğu tartışma konusudur. Bugünlerde Yapay Zekânın sinematografide elde ettiği sonuçların mükemmele yakın olduğu da yapılan kodlamalarla erişilen sonuçlara bakıldığında ayrıca dikkati çekmiştir.

Film çekiminde önce senaryoda geçen dünyanın ve karakter tasvirlerinin metne aktarılması işi ve sonrasında yönetmen, sanat yönetmeni ve sinematograf tarafından ekran için uyarlanma süreci anlatılır. Sinematograf (ya da görüntü yönetmeni) film için gerekli olan görsel stili ve teknik unsurları belirleyerek yönetmenin vizyonunu her sahne ve sekans için uyarlar. Tam da bu noktada yapay zekâ, sinema endüstrisinde önemli bir rol üstlenir ve çeşitli film üretim süreçlerinde rahatlıkla kullanılabilir. Bunlar arasında sahnelerin ön

görüntülenme işi, aydınlatma simülasyonları, renk paleti oluşturma, görsel efektler ve sanat üretimi yer almaktadır. Ön görselleştirme, sinematografların ve yönetmenlerin sette veya konumda çekim yapmadan önce sahneleri planlamalarına olanak tanıyabilir. Bu aşamada yapay zekâ, çeşitli aydınlatma senaryolarını modelleyerek sinematografların farklı aydınlatma düzenlemelerini denemelerine ve son görüntünün nasıl etkileneceğini ön izlemelerine de yardımcı olur. Sahne reel boyuta geçmeden yapay zekâ yardımı ile sinematografın kabiliyeti dâhilinde önceden görülebilir. Günümüzde görsel efekt kullanımlarının, film endüstrisinde zaten ayrılmaz bir parça haline geldiği söylenebilir. Yapay zekânın, gerçekçi görüntüler yaratma ve CGI kullanımını azaltma konusunda önemli bir role sahip olduğu söylenebilir. Yapay zekânın, doğal sahneleri simüle etmek veya hayali dünyalar yaratmak için kullanılan bilgisayar grafikleri, kompozitleme ve animasyon programlarının gelişiminde önemli bir rol oynadığı da ayrıca belirtilebilir. Geleneksel tasarım stüdyoları, 1990'ların başından bu yana teknolojik gelişmeler doğrultusunda önemli bir dönüşüm geçirmiştir. Yapay zekâ, film veya televizyon programlarında gerçeklik illüzyonu yaratmak için CGI kullanımına olanak tanır.

Sinematografi, metni görselleştirmenin sanatı olarak tanımlanabilir. Sinematograf; aynı ekip, senaryo, mekânlar ve hatta sinematografik referanslarla bile farklı bir sinematografın filmdeki tüm sinematografinin dramatik olarak değişmesine neden olabileceği bir süreci yönetir.

Genel olarak Yapay zekânın sinematografide önemli bir yer edinmeye başladığı ve bu teknolojinin film yapım süreçlerinde giderek daha fazla kullanılacağı ele alınan çalışmada örneklere dayalı olarak açıklanmaya çalışılmıştır. Yapay zekanın sinematografideki rolü ve etkileri hakkındaki tartışmalar devam etmekte olup bu teknolojinin sanat ve sanatçı kavramları üzerindeki etkilerinin gelecekte daha da önem kazanacağı söylenebilir. Tıpkı bir insan gibi öğrendiklerini organik yol yerine algoritmayla yapıyor diye yapay zekânın oluşturduğu müziğe veya resme "sanat değil" diyebilmek için günümüzde halen pozitif bir argüman bulunmamaktadır. Zira yapay zekânın, yaptığı eserlerle en usta sanatçıların bile insan yapımı diyebildiği eserleri üretebilme kabiliyeti bulunmaktadır.

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