Artificial Intelligence Systems Impact on Film Sets in the 21st Century

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Abstract:

AI systems and technologies play a vital and effective role Film Production Design. It has become one of the Film Production Design because of its diversity and its ability to develop and acquire qualities that make it fit with each specialty and play the role required of it according to its user, who is a member of the team based on the design and production of the film beginning with the writing of the text, The storyline, the selection of eligible actors for roles, the stages of constructing Sets for Shooting actions or digital environments as extensions of the Live Shoot environment, and the creation of digital characters and Visual Effects . The role of AI systems and tools has developed the Production Design for films such as Lord of the Rings, The Irishman, and numerous more well-known films whose teams have recruited AI in their Film making and production. It was thus worthwhile to investigate that phenomenon, which became an active member of the team as the film's concept and production progressed. So we concluded that AI tools have opened new horizons for cinematographers in developing their visions to create worlds with endless imagination that produce a cinematographic image with unique characteristics.

Purpose and scope:
Artificial intelligence is one of the most important scientific advancements that academics are now interested in across a wide range of subjects and disciplines, and it presents limitless opportunities for growth and creativity. Movies, particularly film perspectives, are attractive areas for the use of AI applications, and it is critical to research and learn about their potential and methods of dealing with them.

The objective of the study is:
Learn how to leverage AI applications to develop design and execution processes for Set and image of Film Production Design.

Method:
The paper follows the descriptive and analytical method of reaching results that demonstrate the importance of the research study.

Introduction:

Artificial Intelligence refers to the branch of computer science that deals with the development and simulation of algorithms and systems that can mimic human cognitive abilities. This includes teaching machines to interact with and interpret human behaviour. One of the defining features of AI is its ability to learn from experiences, which is referred to as "robot education." AI systems have played a significant role in the field of special effects and computer-generated imagery (CGI) since the 2000s.AI has become a vital component of the film industry, with films like The Lord of the Rings in 2001 and The Matrix in 1999 demonstrating how directors have utilized it for tasks like facial recognition technology, text writing, and so on.AI has emerged as a critical aspect of the film industry, as evidenced by films like "The Lord of the Rings" as shown in figure 1, and "The Matrix" in 1999. These films showcase directors' utilization of AI for tasks such as facial recognition technology and text writing. In the movies A Space Odyssey, 2001, The Terminator, 1984, Star Wars, 1999, and Her 2013, The Irishman 2019 as shown in figure 2 , AI systems were used to portray human-like machines who can think, feel, and act independently (Chase 2023).(1)

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Figure 1. A still from Peter Jackson's 2002 film The Lord of the Rings depicts how artificial intelligence algorithms are used to create human models that portray armies at the Battle of Helm Deep

Figure 2. A Shot of The Irishman shows the use of artificial intelligence tools to show human features at a younger age by the company specializing in VFX Industrial Light & Magic (ILM), directed by Martin Scorsese in 2019

Artificial Intelligence and its uses in Film Production Design.

Artificial intelligence methods were utilized in Lord of the Rings to generate many human models, or armies, in the movie's scenes. Based on the events of the film, there were roughly 10,000 marchers making their way towards the castle situated on a mountainside. Massive, a program created especially for the movie by Stephen Regelous, was used in that conflict with the events of the movie to generate artificial intelligence-powered computer armies that would imitate real-world fights in those large, expansive areas (Erin 2022).(2)

AI tools have had a significant effect on film making and production phases, as AI technologies are integrated into the film production process throughout multiple stages (pre-production, production, and post-production).

'Filmustage' is an AI software that breaks down and analyses the text of films. This tool can obtain split text by uploading any text and automatically producing text reports that correspond to each change in scenario. However, it is no longer a substitute for human experience. Completing what is required in a helpful and timely manner defines its borders.

Array's software, which blends digital environments with actual Shoots during photography, was utilized in post-production phase and then later in digital Compositing.

The Arraiy System is a system that can separate certain parts of the Shoot Image from the background, such as an actor or moving object, by means of Rotoscope, which enables the experimentation of various visual effects using Unreal Engine.

Deep Fake, another program, utilizes automated education algorithms to generate visual content that is based on another person's face or voice in a digital setting.

The Irishman in 2018 is a film that utilizes that technique, and it uses the neural reconstruction of Robert De Niro's face to portray him at a younger age than he is.

AI tools can be used, and they can be a useful help in terms of reducing the time taken at each stage of the film's production, beginning with the preparation of the text-splitting summary.

The photography schedule also contributes to the implementation phase of visual effects and digital

installation in the actual time of production of films based on CGI techniques, as well as allowing landscape designers the freedom to produce models and views using artificial intelligence systems.

Data analysis and artificial intelligence technology, which is defined as a replication of human intellect in robots designed to understand and act like humans, have previously been portrayed for the first time in cinematography. Artificial intelligence techniques refer to machines that exhibit mental functions like learning and problem-solving (Angana & Ruchi 2020). (3)

Artificial Intelligence Impact on Film Pre-Production Design.

AI tools can comprehend texts and scenarios and recognize the locations they are described in; thus, they have a definite place in the pre-production and production stages. They can also be used to create a Shooting schedule. It may also select actual locations that are suitable for filming based on its Description in script, which saves a ton of time spent looking for the best locations to shoot scenes at. Moreover, it can aid in the process of choosing suitable actors "Casting phase "Display quotations of over 40 words, or as needed (Ibrahim & Hadeir 2022) .(4)

AI systems have made a significant contribution to the film industry by creating unique worlds and spatial Sets that align with the concepts and observations of Production Designers at the preliminary stage of known as Concept Design (Ibrahim & Hadeir 2022) .(5)

And at the level of writing, whether in the film's plot or language. ScriptBook is a text analysis platform developed using AI tools. It examines the material and predicts the film's success. In the film Ex Machina, artificial intelligence algorithms were utilised to develop fresh lines of conversation for Ava the human robot – as shown in figure 3 . The programme analyses massive volumes of text data to generate a fascinating and realistic personal interaction (Negishi 2023). (6)

Figure 3. A Shot of Ex Machina Movie, shows the use of artificial intelligence tools to, directed by Alex Garland in 2014

AI Impact on Film on Set Production Phase.

To prepare for the development of comparable approaches during the imaging and production phases, artificial intelligence (AI) systems enabled the exploration of potential camera automation techniques in digital cinematography. These technologies have been made possible by artificial intelligence (AI) systems. – Even so, it's still in the experimental phase. Essentially, AI systems can be used in these formative stages of film production. There is a lot of research in the field of cinematography, especially moving as spaces for experimenting with virtual cinematography by 3d automatic/Intelligent for bulleted lists (Ibrahim & Hadeir 2022) .(7)

AI Impact on Film on Postproduction Phase.

According to some Film Set Designers of the 21st century, AI tools and systems find a place in the rudimentary stages of film production where tools/applications such as Midjourney or DALL-E. can be used to present a horizon and images with diverse and multifaceted imaginative aspects as inspirations and extensions of the Set (Production Designers collective). (8)

James Cameron is considered one of the key innovators of the 21st-century film business, having set the standard for more than 40 years in the ways and means by which cutting-edge technology is employed in the process of making movies. This was demonstrated by the films' employment of digital embellishments and computer-generated imagery (CGI), which altered the manner of the cinematography. Examples of these are the Terminator series and Avatar. James Cameron attested to his utilisation of deep learning methods. During the conception stage of the Avatar film series, machine learning was employed in conjunction with artificial intelligence (AI) methods to create a conceptual design of the scene.

All accessible photos are used as data sources for AI technologies that generate and produce images. As a result, artificial intelligence is merely a copy programme that doesn't comprehend what it generates (Business Think) (9)

In Avengers Endgame movie, AI tools were used to replace actors with Similar younger digital characters in age, as shown in figure 4 , AI tools are able to complete frequent process tasks to produce a CGI digital falcon that also enables the encrypted digital integration to be completed in the Real time of Shooting. Artificial intelligence software was also used to remove shadows and reflections from actors' faces, during the post-production phase in The Social Network movie (Negishi 2023) (10)

Figure 4. A Shot of Avengers: Infinity War Movie, shows the use of artificial intelligence tools in motion capture techniques, directed by Anthony Russo, Joe Russo in 2018

To produce the characters in The Quarry, the masquerade facial capture system developed to replicate actor Josh Brolin's resemblance to the fictional character Thanos was used in Avengers: Infinity war. The function of this AI tool is to convey the real actor's performance through the device mounted on his head during the scene's acting performance , as shown in figure 5 (Stanley 2022) (11)

Figure 5. A Shot of The Quarry game, shows the use of artificial intelligence tools in motion capture during production phase, 2022.

So, AI can help develop the design process but cannot replace the design itself or create a new design.

The concept of "artificial intelligence" was first presented in cinematography as a fantasy idea, but it was eventually realized as an expression of the danger that technology brought to humankind. Film producers can now use AI-powered software like After Effects to use automation-powered technologies, such as motion tracking and visual effects, instead of laborious manual work.

Additionally, a software that helped prepare changes to the cinematographic image in terms of the "Adobe Firefly" program's output (Dhillon 2023). (12)

"AI generated environments" are digital worlds made possible by AI techniques inspired by film production, which provide designers new avenues to explore while creating a story.

It is an automatic learning setup for digital representation created by AI models.

– Deep learning techniques and machine learning are two branches of artificial intelligence that allow machines to learn from data without explicit programming. A subset of machine learning is called deep learning. What mimics or simulates the way the human brain learns using artificial neural networks (ANNS)

- These models can generate realistic and varied worlds that may be expanded upon or added during

actual filming by learning from vast volumes of data, including images and videos, texts, and sounds.

Some instances of artificial intelligence-generated surroundings are as follow:

Neural Holography: This method creates 3D screens that project 3D pictures into the air using neural networks. With the use of this technology, high-resolution visuals may be produced that can be viewed from any angle without the need for glasses or headphones. As a result, interactive digital spatial environments can be created during the film scenery production process.

Neural Rendering: This technology fills in the neural show/display gaps, enhances details, and corrects picture faults utilizing learned precedents, acquired context, and networks to synthesize realistic images from fragmented or partial data. Partially seen or low-quality data can be virtually viewed via neural demonstration.

Neural Style Transfer: This method transfers an image's style to another image by means of neural networks. This technique also helps create virtual views of existing images by altering the appearance, colour, texture, and overall ambiance of a picture depending on another image.

Film Set Design produced by AI systems.

Artificial intelligence settings are produced by technology, which is based on machine learning and deep learning. These technologies allow machines to learn from data and produce new data.

There are three primary steps involved in developing artificial intelligence environments.

1) Data Collection

Large volumes of data, including images, videos, texts, and audio, are gathered in this step from a variety of sources, including online data sources, cameras, scanners, sensors, and more. After that, the data are categorised, organised, and harmonised until they are required for later processes.

2) Data Analysis

This phase involves feeding data into neural networks, which then analyse it and extract qualities, characteristics, patterns, and outcomes. The neural networks are then trained using various methods, such as enhanced learning based on goal and purpose. Next, neural networks create a model that can create new data and represents learned information.

3) Data Synthesis

At this point, new data that complies with the necessary requirements—such as those related to accuracy, quality, style, and content—is assembled using the model. Next, show the updated statistics on an appropriate screen, projector, or header clock. The ability of neural networks to produce digital views with a multitude of subtle and varied details

that can be modified or added to in real-time Real Time sets artificial intelligence's digital environments apart. This allows filmmakers to create spatial environments with accurate and realistic architectural details in accordance with the architectural Style and dramatic Mood Requirements.

Artificial intelligence environments are digital representations of scenes created by artificial intelligence models using machine learning (ML) and deep learning (DL) techniques. ML is a branch of artificial intelligence that enables machines to learn from data without explicit programming.

DL is a branch of machine learning (ML) that simulates how the human brain learns by using artificial neural networks (ANNs). Large volumes of data, including images, videos, text, and music, can be used to train AI models to generate a variety of realistic settings that can be instantly customized and analysed. Using artificial intelligence surroundings, filmmakers may construct more immersive, versatile, and effective virtual groups than traditional approaches.

Among the many advantages of artificial intelligence environments is their capacity to unleash the creative potential of filmmakers. Here are a few instances of AI environments: Filmmakers can explore fantasy and fantasy worlds that would be difficult or impractical to produce or find in real life by using artificial intelligence surroundings.

Some examples of films that utilized AI-generated environments for key scenes include.

Avatar Movie (2009): The extraterrestrial planet Pandora and its unusual flora and fauna were created in this movie using artificial intelligence environments. The movie created immersive and interactive virtual sequences that flawlessly mix with live action material by utilizing motion capture and realistic computer-generated imagery.

Ready Player on Movie (2018): The film employed Motion Capture and CGI technology to create views of the region according to its nature in events that contrasted with the dystopian real world. The artificial intelligence (AI) environments were used to construct the virtual reality world of the OASIS perspective and its different regions. A Dystopian Reality.

The Lion King Movie (2019): The filmmakers of this movie employed computer-generated imagery (CGI) to produce digital views that resembled the original animated picture, and they also used AI-generated surroundings to create a green zone vision of the African savannah and wildlife world (Hays 2023). (13)

Avatar: The Way of Water movie (2022): Artificial intelligence (AI) was utilised to produce

fictitious characters and create effects for the movie. AI algorithms were used to analyse the screenplay of the movie, suggest adjustments and enhancements, and come up with ideas for additional scenes that would grow inside the events of the scene. To better match actors' attitudes and gestures, artificial intelligence methods were also utilised to evaluate actors' performances and modify computer-generated digital characters (The daily star 2022). (14)

To better match actors' attitudes and gestures, artificial intelligence methods were also utilised to evaluate actors' performances and modify computer-generated digital characters (Blinx AI 2022). (15)

These movies serve as templates for how artificial intelligence (AI) might be used to design spatial spaces that capture the dramatic atmosphere and distinctive architectural style of the Action.

One feature of artificial intelligence-created spatial settings is its ability to deliver enough and calculated lighting based on the physical properties of the things. Shadows, reflections, refractions, scattering, and other natural phenomena may all be simulated by artificial intelligence. Furthermore, it may simulate human behaviors like as body language, facial emotions, and speech, which impact how people respond in different settings, as well as physical phenomena such as gravity, friction, and collisions, which influence how objects behave in different situations.

These surroundings also provide opportunities for development, transformation, and expansion. These digital settings may be created and updated in real time using specialized technologies, allowing such environments to work without the requirement to construct realistic views on a physical scale. They can also be changed to reflect the perspective and viewpoint of cinematic film creators. It can also reduce the need for travel to remote locations that may be difficult to access. Furthermore, it can assist alleviate the difficulties and complexities associated with representing actual ratios and aspects linked to lighting, sound measurements, and composing installation phases with digital extensions when making tiny models.According to research, the use of artificial intelligence-generated landscapes is likely to continue and evolve into a future direction or style for filmmakers and cinematographers.

The following advancements and improvements in the field of Film Production design have been made possible by the application of AI systems and tools.

Mixed Reality: This technology creates immersive and interactive settings that blend the real and digital worlds by fusing Virtual Reality (VR) with Augmented Reality (A.R.). Filmmakers can now employ AI environments as 3D projections that can be added to and seen within a real spatial context thanks to this technology.

Generative adversarial networks (GANs): These neural networks are a particular kind that consists of two competing models: "The generator generates new data, while the other model is unique and analyses data." The 21st-century film industry is seeing an increase in demand for GANs technology to be used in Film Production design stages, as it offers more diverse and realistic features with boundless imagination.

Neural scene graphs: These structural data bases depict the Movie Scene as graphs of objects and their attributes; thus, landscape designers can employ artificial intelligence environments wherein the addition and adaptation of features are more precisely controlled within the context of the scene (Hays 2023). (16)

Taking advantage of the various opportunities and solutions provided by AI technologies and technologies in the design of the Set and spatial environments of film in the twenty-first century, cinematography can introduce a new era of diversity of visions and ideas and work to implement them.

Science fiction films introduced the idea of replacing the human element with technology as a fantastical concept. A vast area of research, study, and development in AI technology for application in the creation of cinematographic images has been made possible by AI systems and tools.

AI Video Generation Company is one of them; it has started showcasing its technology in films like Everything, Everywhere, and All at Once. The promise that artificial intelligence (AI) offers has been welcomed by some of the industry's pioneers, who specialize in using it to generate films. They even promote the technology's use and reliance on AI as a new kind of art that is crucial to the creation of movie images. To meet the demands of the filming and production phases, film producers also work on the advancement of ICT and its methodologies and trends. However, several filmmakers and producers have conceded that while AI can be useful, it cannot replace a creative designer or match human potential and talents during the filmmaking process. However, it is capable of comprehending and learning from AI experiences to make the best and most appropriate use of their natureAI Video Generation Company is one of them, and it has begun displaying its technology in films such as Everything, Everywhere, and All at Once. Some of the industry's pioneers, who specialize in employing artificial intelligence (AI) to create films, have welcomed the potential it holds. They even

advocate the technology's usage and dependence on AI as a new type of art necessary for the creation of film visuals. To satisfy the demands of the filming and production phases, film producers concentrate on the evolution of ICT, including techniques and trends. However, numerous directors and producers have acknowledged that, while AI can be valuable, it cannot replace a creative designer or equal human potential and abilities in the filmmaking process. Some have expressed concern to future generations of designers about becoming excessively reliant on these technologies and not employing their imaginations or training their minds to develop ideas and creative possibilities that outperform those provided by artificial intelligence systems. To ensure that artificial intelligence capabilities are utilized in a way that serves humanity rather than detracts from it, key global research and educational institutions must strive to set standards and laws controlling their utilization. (Jalil 2023).(17)

Conclusion:

- AI has become an area worthy of study and analysis due to its rapid evolution and impact on film making.
- AI tools have opened new horizons for cinematographers in developing their visions to create worlds with endless imagination that produce a cinematographic image with unique characteristics.
- AI methods have driven optical effects specialists to design and produce programs using AI tools that have a role to play in achieving and creating new insights and images in the cinematic landscape.
- AI tools demonstrated capabilities and capabilities that created the need for them by filmmakers and filmmakers to realize their visions.
- AI tools contributed to the implementation and realization of what was difficult to implement before they emerged.

References:

1- Neil Chase, Artificial Intelligence In Film: Impact & Influence for 2023+, Updated: July 23, 2023, (Neil Chase Film) https://neilchasefilm.com/artificial-intelligence-in-film/, last retrieved 7 September, 2023.

2- Carson , Erin , How 'Lord of the Rings' Used AI to Change Big-Screen Battles Forever, CNET, https://www.cnet.com/culture/entertainment/features/how-lord-of-the-rings-used-ai-to-change-big-screen-battles-forever/, Sept. 4, 2022 5:00 a.m. PT, last retrieved 12/1/2024.

3- Datta, Angana & Goswami, Ruchi. (2020). The Film Industry Leaps into Artificial Intelligence: Scope and Challenges by the Filmmakers. 10.1007/978-981-15-6014-9_80 https://www.researchgate.net/publication/345259587_The_Film_Industry_Leaps_into_Artificial_Intelligence_Scope_and_Challenges_by_the_Filmmakers

4- Noshokaty, Ibrahim & Mohamed, Hadeir. (2022). CAN AI RULED A CINEMA INDUSTRY PROFESSOR: IBRAHIM ELNOSHOKATY @ 2022.P 3,4 https://www.researchgate.net/publication/360609888_CAN_AI_RULED_A_CINEMA_INDUSTRY_PROFESSOR_IBRAHIM_ELNOSHOKATY_2022

5- Noshokaty, Ibrahim & Mohamed, Hadeir. (2022). CAN AI RULED A CINEMA INDUSTRY PROFESSOR: IBRAHIM ELNOSHOKATY @ 2022.P 4. https://www.researchgate.net/publication/360609888_CAN_AI_RULED_A_CINEMA_INDUSTRY_PROFESSOR_IBRAHIM_ELNOSHOKATY_2022

6- Ariane Negishi, How Artificial Intelligence is Revolutionizing the Film Landscape, https://www.cinemagics.com/post/how-artificial-intelligence-is-revolutionizing-the-film-landscape, Sep 5, 2023, Last Retrieved 28 Jan 2024

7- Noshokaty, Ibrahim & Mohamed, Hadeir. (2022). CAN AI RULED A CINEMA INDUSTRY PROFESSOR: IBRAHIM ELNOSHOKATY @ 2022.P 4. https://www.researchgate.net/publication/360609888_CAN_AI_RULED_A_CINEMA_INDUSTRY_PROFESSOR_IBRAHIM_ELNOSHOKATY_2022

8- Production Designers Collective, Conversations about Artificial Intelligence in Filmmaking We ask colleagues in VFX, Art Direction and Illustrations to share their thoughts on using AI in their work.) Production Designers Collective) https://www.productiondesignerscollective.org/single-post/conversations-about-artificial-intelligence-in-filmmaking, last retrieved 14 December , 2023

9- Business Think, The World Business Forum was held at the ICC Sydney Sydney from 11 to 12 October 2023, https://www.businessthink.unsw.edu.au/articles/james-cameron-ai-creativity-and-innovation, 6 November 2023 , last retrieved 19 January, 2024 .

10- Ariane Negishi, How Artificial Intelligence is Revolutionizing the Film Landscape,

https://www.cinemagics.com/post/how-artificial-intelligence-is-revolutionizing-the-film-landscape, Sep 5, 2023, Last Retrieved 30 Jan 2024

11- Alyse Stanley, The AI tool behind Thanos made facial animation in 'The Quarry' a snap, https://www.washingtonpost.com/video-games/2022/06/28/quarry-avengers-thanos/, June 28, 2022, last retrieved 30 January, 2024 .

12- Sunny Dhillon , HOW AI WILL AUGMENT HUMAN CREATIVITY IN FILM PRODUCTION, Variety Magazine, Variety Intelligence Platform (https://variety.com/vip/how-artificial-intelligence-will-augment-human-creatives-in-film-and-video-production-1235672659/) JULY 20, 2023 6:00AM PT , last retrieved 14 December , 2023

13- Edward Hays , Virtual Sets and Beyond: The Future of Film Production with AI-Generated Environments, Aug 7, 2023 (https://medium.com/@toddkslater/virtual-sets-and-beyond-the-future-of-film-production-with-ai-generated-environments-2125bb565492) , last retrieved 14 December , 2023 .

14- The daily star , From VR to AI, here are all the latest technologies used in Avatar 2 , https://www.thedailystar.net/tech-startup/news/vr-ai-here-are-all-the-latest-technologies-used-avatar-2-3206251, Tue Dec 27, 2022, Last update on: Tue Dec 27, 2022 12:13 PM, last retrieved 22 January 2024

15- Blinx AI, Artificial Intelligence Behind Avatar: The Way of Water, https://medium.com/@blinx/artificial-intelligence-behind-avatar-the-way-of-water-9c0ad13875a6#:~:text=Computer-generated%20imagery%20%28CGI%29%20was%20used%20in%20many%20movies,movements%20that%20were%20put%20on%20the%20virtual%20characters., Dec 16, 2022, last retrieved Jan 22, 2024.

16- Edward Hays, Virtual Sets and Beyond: The Future of Film Production with AI-Generated Environments, Aug 7, 2023 (https://medium.com/@toddkslater/virtual-sets-and-beyond-the-future-of-film-production-with-ai-generated-environments-2125bb565492), last retrieved 14 December, 2023.

17- Jannat Jalil , How AI is reshaping filmmaking: Insights from UNESCO's conference in Paris, Published on 24/10/2023 - 07:25, (https://www.euronews.com/culture/2023/10/24/how-ai-is-reshaping-filmmaking-insights-from-unescos-conference-in-paris), last retrieved 14 December , 2023