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AI and Cinematography, Transforming Production Process After AI

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Abstract:
Across the global, the technological revolution has significantly altered the course of human life. The traditional processes have been taken over by the vast expansion of technology and advancement in almost every field. One contemporary example is the adoption of Artificial Intelligence. With this in consideration, Artificial Intelligence has revolutionized the film making process. AI is not just new tools; they are changing how movies are made at every stage. This paper explains how AI is transforming the process of filmmaking, from writing the script, preparing for the shoot, filming on set, and post-production. The advent of AI powered drones and cameras helps during the filming and production process, the AI based software help in writing scripts while post-production process is simplified through editing software that are powered by AI. The paper explores the available industry data and research to show how AI is shaping everything from story development to visual effects.

Keywords: Technological Revolution, AI, Cinematography, Post-Production, AI Tools.

Introduction:

The advancement in technology has generated multiple avenues in almost every field. Similarly, the advent of Artificial Intelligence has created unlimited opportunities for humans to excel. Today, AI has a wide variety of uses from self-driving cars to search engines. AI has already begun to upend countless industries. Before going into the details, it is imperative to discuss what is Artificial Intelligence? According to National Aeronautics and Space Administration[1] (NASA) Artificial Intelligence is "referring to computer systems that can perform complex tasks normally done by human reasoning, decision making, creative analysis." On the other hand Linguist, Noam Chomsky[2] argues that software such as ChatGpt hardly constitute true Artificial Intelligence because such programs are stuck in a pre-human or non-human phase of cognitive evolution." He believe that "there deepest flaw is the absence of the most critical capacity of any intelligence". The film making industry has always had a complex relationship with the new technology, often times, simultaneously embracing and pushing it forward while lamenting the changes it brings. Where few consider AI as the promise of new technology, other sees the peril. Artificial Intelligence has transformed the movie industry especially the production process. To some extent,

[1] May, K. (2024, May 13). *What Is Artificial Intelligence?* NASA. https://www.nasa.gov/what-is-artificial-intelligence/
[2] Abdullrahman burhan. (2023, March 30). *Noam Chomsky on the False Promise of ChatGPT! - Abdullrahman burhan - Medium*. https://medium.com/@abdullrahmanburhan36/noam-chomsky-on-the-false-promise-of-chatgpt-18c70cda5e24

it has revolutionized the process of Cinematography. Moreover, it is evident from the practices and new film making techniques, AI is now used in almost every process of film making. From writing script to pre-production, production and post-production process, AI is utilized and is becoming a key feature in modern film making[3]. AI as a concept is not new and has been discussed and experimented with since the mid-20th Century. However, by the 2020s, investment in AI increased exponentially and the technology has experienced great advancement and expansion in the past few years. Today, we are in another major shift, driven by Artificial Intelligence. Unlike earlier changes that were mostly about new machines, this one is about software. It affects the work of writers, producers, camera crews, and editors alike. By 2025, AI is widely used in filmmaking. Reports show that most film production use AI tools. At the 2025 MIT AI Film Hackathon[4], about 95% of films used AI for video generation, and more than half used AI for sound and voices. Building on this, it is evident that AI has altered the way creative ideas are realized in addition to speeding up the filming process. AI tools are increasingly used by directors, writers, and editors to generate ideas and improve graphics that used to take weeks. With the aid of sophisticated software, storyboards can be created in a matter of minutes, visual effects may be improved with more accuracy, and editing can be completed more efficiently. AI-powered tools that understand a creator's style and assist in maintaining consistency across a film even enhance sound design and color grading. To put it simply, AI can make planning and shooting more efficient, its biggest impact is in post-production, where it can create images that never existed in real life.

Literature Review:

Unlike other subjects, the inclusion of AI is film making is relatively new, however, it has seized the attention of various scholars and who defined AI and cinematography according to their understanding. In this regards, various journals, books and scholarly articles have been written to explain the rising phenomenon of AI in Cinematography. While few believe it to be a revolutionary step forward, other discusses its demerits. Movies such as Ex Machina, Matrix, Terminator and many others depict AI based scenes: an indication that AI is used in the production process. To understand the phenomenon in its true essence, let us discuss what subject experts have to say about Inclusion of AI in film making. In his article "A Study of Artificial Intelligence in the Production of Film", Peiming Sun[5] explores that AI technology has benefits for improving productivity and cost-effectiveness in the filmmaking process. Additionally, it can improve a movie's overall quality by producing amazing special effects and giving filmmakers new tools and methods to experiment with. However, He is also of the view that there are drawbacks to AI technology as well, such as a lack of human touch and complexity in the artwork generated by AI. Published in the Telecommunications Policy Journal, Vasilis Tsiavos and Fotis Kitsios[6] in their article argue that there are emerging ethical concerns, such as authorship, creative integrity, and labor displacement that accompany AI's expanding role. Their findings reveal that artificial intelligence has long played a role in the film industry, and its influence has only grown with recent advancements in AI, having an impact across the film industry's value chain. The Historical

[3] Du, W., & Han, Q. (2021). Research on application of artificial intelligence in movie industry. In Y. Zhang(Ed.), *2021 International Conference on Image, Video Processing, and Artificial Intelligence*. SPIE. Presented at the conference held in Shanghai, China

[4] *MIT AI Film Hack*. (2025). MIT AI Film Hack. https://mitaifilmhack.com/

[5] Sun, P. (2024). A Study of Artificial Intelligence in the Production of Film. *SHS Web of Conferences*, *183*, Article No. 03004. https://doi.org/10.1051/shsconf/202418303004

[6] Tsiavos, Vasilis & Kitsios, Fotis. (2025). *The digital transformation of the film industry: How Artificial Intelligence is changing the seventh art.* Telecommunications Policy. 49. 103021. 10.1016/j.telpol.2025.103021.

Evolution of Artificial Intelligence Technology in Cinema describes how AI has moved from simple CGI[7] enhancements to more sophisticated roles involving deep learning and generative AI. Artificial Intelligence is not a post-production tool anymore; it is becoming integrated at almost every phase of filmmaking. In The Interconnection between AI and the Film Industry, Ngugi[8] explores how AI is being used in script analysis. With the ability to predict audience reaction, tools can analyze character development and can assist with structuring. Xu et al, 2025 explore in the article "A Multi-Agent Framework for End-to-End Film Automation in Virtual 3D Spaces" a system wherein several AI agents will mimic the roles of the director, screenwriter, actor, cinematographer, etc. This is relevant to exploring how AI might restructure not just individual tasks but the whole creative workflow. While literature suggests there are plenty of advancement in AI and film making, there are still gaps that need to be covered. There is a need for more empirical studies on how human directors/cinematographers actually work with AI on set and what can be the most effective workflow for collaboration? How does the use of AI change the long-term creative identity of cinematographers or film crews? And more importantly, the economic aspects of inclusion of AI in film making, where is a lack of detailed economic analyses on cost savings versus job displacement within real-world production companies.

AI in Scriptwriting and Development:

The script is the starting point of any movie. It has long been considered the most human part of filmmaking. But since making movies is expensive and the risks are high, various studios now use AI tools to predict whether a script will succeed before they decide to make the movie. Studios used to rely on producer's instincts when choosing which movies to make. Now many use AI systems that analyze scripts using natural language processing and large databases of past movies. ScriptBook[9] is one of the known companies in this area. It says its software can predict how well a film will perform at the box office with almost 84% accuracy, better than human studio executives. The system reads the script and studies things like pacing, emotional tone, dialogue, and genre. Then it compares the script to a database of tens of thousands of films whose financial performance is already known. In one study, ScriptBook correctly flagged 22 out of 32[10] Sony Pictures movies that later proved to be unsuccessful, movies that human executives had approved. Likewise, another company, Cinelytic[11], adds actor data to the prediction. Producers can test "what if" situations, like what would happen if a different actor was cast or if the movie was released at another time of year. By using past box-office data, Cinelytic[12] estimated the financial value of different actors in different markets. This makes casting less of a purely creative decision and more of a financial calculation.

Structural Analysis and Improving the Story

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[7] Chen, Y. (2021). *Automated editing and AI: The new frontier of post-production*. Film Technology Review, 14(2), 112–128

[8] Ngugi, Jonathan. (2025). *The Interconnection Between Artificial Intelligence (AI) and the Film Industry.* Journal of Information and Technology. 5. 1-11. 10.70619/vol5iss9pp1-11.

[9] AI Case Study | *ScriptBook produces financial forecasts for films based on their scripts using machine learning and natural language processing*, accessed December 5, 2025, https://www.bestpractice.ai/ai-case-study-best-practice/scriptbook_produces_financial_forecasts_for_films_based_on_their_scripts_using_machine_learning_and_natural_language_processing

[10] ScriptBook - *Hard Science. Better Content*., accessed December 7, 2025, https://www.scriptbook.io/

[11] Cinelytic | *Built for a Better Film Business*, accessed December 7, 2025, https://www.cinelytic.com/

[12] From Greenlight through Release, *Cinelytic Provides Actionable Insights in Real-time*, accessed December 9, 2025, https://www.cinelytic.com/platform/

AI can now study how a script is built, its structure, pacing, and emotional flow. Deep learning systems compare a script to well-known storytelling patterns like the Hero's Journey or Freytag's Pyramid. They look at things such as how often action happens, how much dialogue there is, and how emotions rise and fall throughout the story. Researchers found that these tools can point out problems that writers often miss. For example, if the middle of the script is too slow, the AI can show a visible dip in story tension when compared to successful movies in the same genre. With this information, writers can fix pacing, improve character arcs or even rewrite dialogue in a more focused way, not just for grammar but for the whole structure of the story.

Platform	Core Functionality	Methodology	Strategic Implication
ScriptBook	Box Office Prediction, Script Analysis	Deep Learning (NLP) on script text vs. historical database.	Identifies "flops" pre-production; encourages data-backed greenlighting.
Cinelytic	Talent Valuation, Distribution Strategy	Predictive modeling using talent & territory data.	Optimizes casting for specific international markets.
StoryFit	Narrative Analytics	Character trait mapping, sentiment analysis.	Ensures character demographics align with target audience.

Generating Writing: Helping Writers, Not Replacing Them:

Using large AI language models to write scripts is one of the most debated uses of AI. AI can create ideas, scene summaries or sample lines of dialogue. But most filmmakers agree that today's AI is better at helping writers than replacing them[13]. However, the AI generated text is often generic in nature and ignores the deeper meaning that a real film requires. In this regard, AI is often used by writers for brainstorming and generation ideas. Its best use could be to obtain several versions on a topic and then explain according to one's understanding. AI is more of an assistant or creative partner of humans that helps human to do their tasks rather than completely replacing them. However, during the 2023 Writers Guild[14] strike one major concern was raised. The writers were of the view that studios may use AI to create a cheaper draft of the film and then pay writers less to improve it. The concern was genuine in nature that AI can be used to devalue the human work. This led to new rules and guidelines, including an agreement called "The Fair Codex," which says that AI can help artists but cannot replace the human creativity

The AI Blueprint: Pre-Production:

If writing is like creating the instructions for a film, pre-production is building the plan. It involves planning sets, choosing locations and visualizing the movie before shooting begins. AI has changed this phase by letting filmmakers see the movie long before cameras roll, reducing

[13] *The Impact of Generative AI on the Film Industry* - Webthesis, accessed December 9, 2025, https://webthesis.biblio.polito.it/35575/1/tesi.pdf

[14] ETHICS OF AI - *Producers Guild*, accessed December 8, 2025, https://producersguild.org/wp-content/uploads/2024/12/Ethics-of-Using-AI.pdf

guesswork and preventing expensive mistakes. In the past, creating storyboards required artists to hand-draw many images, which took a lot of time and money[15]. Generative AI art tools like Midjourney and Storyboarder.ai, makes this much faster and more affordable. Newer AI video-generation tools such as OpenAI's Sora and Runway Gen-3[16] go even further by creating short animated clips. This helps filmmakers preview camera moves and lighting before going on set. For example, the Netflix show The Eternaut used AI-generated previews to plan complex sci-fi scenes early in production. Also there are various benefits of AI visual tools. It is much faster and the changes take minutes instead of days. It provides clear communication; the cinematographer and production designer can see exactly what the director imagines also it is very cheap as compare to normal processes.

Virtual Location Scouting and Planning:

Finding a good filming location usually takes a lot of travel and time. AI tools can search huge libraries of photos and maps to find the perfect place based on the script, matching architecture, lighting, landscape and more. This can save weeks of scouting[17]. AI also helps with scheduling. New production software can read a script and automatically list everything needed such as actors, props, costumes and locations and then build the most efficient shooting schedule. This reduces costs by grouping scenes and minimizing travel.

Problems with AI-Generated Marketing Images:

AI is helpful inside the production team, but using AI for public advertising can be risky. In 2024, the studio A24 was criticized for using AI-generated posters for the movie Civil War. People quickly noticed strange mistakes, a car with the wrong number of doors and unrealistic views of Chicago[18]. The backlash showed that audiences still expect real, human-made artwork when it comes to official marketing.

The Smart Set: AI During Filming:

When filming begins, AI becomes part of the equipment itself. It starts working directly with cameras, lights, and tracking systems, giving filmmakers new levels of precision and control. Some cameras can now operate partly or fully on their own using AI. A major example is Autonomous Camera Drones (CineMPC), an AI-powered drone system[19]. Unlike normal drones that simply follow a subject, CineMPC can control focus, zoom and aperture while tracking a moving target. It follows artistic framing rules for example keeping the actor in the upper-right third of the frame and plans its path in real time. Shots that once required a skilled drone pilot and a focus puller can now be done automatically. Similarly, Robotic camera arms, such as the Bolt, can perform

[15] Mirowski, P., Mathewson, K. W., Pittman, J., & Evans, R. (2023, April). *Co-writing screenplays and theatre scripts with language models: Evaluation by industry professionals*. In Proceedings of the 2023 CHI conference on human factors in computing

[16] The Big 3: Veo 3 vs Sora vs Runway Gen-3 — *How AI is Reinventing Filmmaking*, accessed December 6, 2025, https://www.techquityindia.com/the-big-3-veo-3-vs-sora-vs-runway-gen-3-how-ai-is-reinventing-filmmaking/

[17] Moruzzi, C. (2022). *Creative agents: rethinking agency and creativity in human and artificial systems*. Journal of Aesthetics and Phenomenology, 9(2), 245-268.

[18] Tian, L., & He, M. (2023). *On the Application of Artificial Intelligence Technology in the Field of Film and Television Media*. Probe - Media and Communication Studies, 5(4), 120-124.

[19] Du, W., & Han, Q. (2021). *Research on application of artificial intelligence in movie industry*. In Y. Zhang(Ed.), 2021 International Conference on Image, Video Processing, and Artificial Intelligence. SPIE. Presented at the conference held in Shanghai, China.

extremely precise camera movements[20]. AI lets them repeat the exact same move multiple times, which is essential for visual effects. Some companies even attach scanners to robotics (such as Boston Dynamics' Spot robot) to capture 3D environment data for virtual production.

System	Technology	Precision	Application
OptiTrack	Passive Optical (IR)	< 0.2mm, sub-10ms latency	High-end VP stages, Motion Capture.
Stage Precision	Computer Vision / Markerless	Software-agnostic integration	managing tracking data and lens calibration.
CineMPC	Monocular Vision + MPC	Real-time intrinsic control	Autonomous drone cinematography.

Virtual Production and Real-Time Tracking:
Virtual Production uses giant LED screens that display digital backgrounds. The camera films the actors while the background changes in real time. This technique became famous with movie "The Mandalorian". To make the background look real, it must shift perfectly as the camera moves. Systems like OptiTrack[21] use computer vision to track the camera's position and predict where it's going next. The AI must react within milliseconds to avoid visual glitches. Matching real lighting to a virtual background is difficult. New AI lighting systems can read the LED wall and automatically adjust studio lights. For example, if the virtual sun goes behind a cloud, the real lights dim and cool instantly, making the scene look natural and consistent.

The Synthetic Darkroom: Post-Production as the New Creative Center:
AI helps with writing and filming, but its biggest impact is in post-production. This is now the most important part of filmmaking. Post-production used to be about putting shots together and cleaning them up. Today, it is about creating new things, new images, new sounds and even new performances. AI has turned post-production into a creative engine where entire scenes can be changed or invented.

Making High-End Visual Effects Available to Everyone:
For decades, big visual effects (VFX) were something only large studios could afford because they required huge teams and expensive computers. However, AI has changed this. Now small teams and independent filmmakers can create Hollywood-level effects at a fraction of the cost.

AI Rotoscoping and Compositing:
Rotoscoping means cutting a character out of the background frame by frame. It is slow, boring, and expensive. AI tools like Runway's Green Screen and Adobe's Roto Brush can now do this automatically[22]. This has not only saved extensive labor cost but also became an effective time

[20] Partadiredja, R. A., Serrano, C. E., & Ljubenkov, D. (2020, November). *AI or human: the socio-ethical implications of AI-generated media content*. In 2020 13th CMI Conference on Cybersecurity and Privacy (CMI)-Digital Transformation-Potentials and Challenges (51275) (pp. 1-6). IEEE

[21] Song, Z., Wang, C., Sheng, J., Zhang, C., Yu, G., Fan, J., & Chen, T. (2024). *MovieLLM: Enhancing long video understanding with AI-generated movies* (No. arXiv:2403.01422). arXiv. https://doi.org/10.48550/arXiv.2403.01422

[22] Zhao, X., & Zhao, X. (2024). Application of generative artificial intelligence in film image production. *Computer-Aided Design and Applications*, 15–28. https://doi.org/10.14733/cadaps.2024.S27.15-28

saving tool. This Oscar-winning film had a VFX team of only about seven people, yet the visuals looked like a huge Marvel movie. They used AI tools to automate much of the rotoscoping, tasks that normally take days were done in minutes. This showed the world that high-quality VFX is no longer limited to giant studios.

In-Painting and Generative Fill:
Removing unwanted objects used to require artists to paint over frames by hand. Now, AI tools like Photoshop's Generative Fill can do it instantly[23]. The AI "imagines" the missing background and fills it in perfectly. This makes it easy to fix mistakes, like removing a boom mic or a modern car in a historical scene with just a single click.

De-Aging and Bringing Actors Back to Life:
AI can now make actors look younger or even recreate actors who are no longer alive. This is impressive but also controversial. Before A, movies like The Irishman (2019) needed special cameras and expensive equipment to de-age actors but in 2023, movies like Indiana Jones and the Dial of Destiny used an AI system trained on old footage of Harrison Ford[24]. It replaced his current face with a younger version. The results looked real, though some viewers still felt something off about the voice and expressions.

The Audio Revolution:
AI has changed sound editing even more than video. Before AI, if dialogue had loud background noise, it was often unusable. Actors had to re-record their lines in a studio. Now tools like iZotope RX can separate the voice from the noise with amazing accuracy. This saves time, money, and keeps the natural feeling of the original performance. Moreover, AI can now clone voices almost perfectly.[25] Respeecher has recreated young Mark Hamill's voice in The Mandalorian and fixed accents in other movies. ElevenLabs can turn text into extremely realistic speech, used for temporary voice tracks, documentaries, and even final animation voices. Thought this technology is powerful but raises ethical questions about consent and authenticity.

Smart Color Grading:
Color grading is the process of adjusting the color and overall look of footage. AI tools like the DaVinci Neural Engine now automate much of this work. Through Shot Matching, the AI can make one clip match the color and style of another[26]. The AI finds faces and tracks features so colorists can enhance skin, eyes, and more without manual work. New research shows that AI can learn the "look" of a specific director or film stock and apply that style to raw footage. This gives filmmakers powerful, film-like looks without expensive manual grading.

Drawbacks: Social, Economic, and Ethical Issues:

[23] Zhu, Y., & Zhang, B. (2022). Ai film creation oriented transformation in the era of artificial intelligence. *Art and Design Review*, 10(2), 272-279.
[24] Visser, D. J. G. (2025). Deepfakes under a neighbouring right. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.5046493
[25] Husnain, A. (2023). *The impact of artificial intelligence on filmmaking in 2023*.https://techbullion.com/the-impact-of-artificial-intelligence-on-filmmaking-in-2023. [accessed Dec 04 2025].
[26] Tian, L., & He, M. (2023). On the Application of Artificial Intelligence Technology in the Field of Film and Television Media. Probe - *Media and Communication Studies*, 5(4), 120-124

All of AI's benefits come with serious concerns about jobs, fairness, and truth. The 2023 SAG-AFTRA and Writers Guild[27] strikes happened partly because workers feared AI could replace them. Moreover, the new contract created a rule for Digital Replicas where the studios must get clear permission before scanning an actor and Pay the actor whenever their digital copy is used. This prevents studios from copying an actor once and using their digital clone forever without paying them. Furthermore, Studios tried to replace extras with AI-generated crowds. However, the new rules states that they cannot do this to avoid paying human background actors.

Deepfakes and Truth in Documentaries:

One of the major drawback was that AI created major problems for documentary filmmaking. For example, Roadrunner used AI to recreate Anthony Bourdain's voice reading an email he never actually spoke[28]. Likewise, Welcome to Chechnya used deepfake face-swapping to protect activists' identities. These choices raised ethical questions: Is the film still honest? Should audiences be told when AI is used? Experts warn that without transparency, trust in documentaries may collapse.

Conclusion: A Hybrid Future:

It is without a doubt that AI is transforming every stage of filmmaking. Writing is becoming more data-driven, Pre-production now let's filmmakers visualize almost anything before filming, Production uses autonomous cameras and AI-driven lighting and Post-production is now a creative powerhouse where entire visuals and performances can be generated. The future would not be that AI will replace humans, it will be humans and AI working together. But as the 2023 strikes showed, the industry must protect human rights, human creativity, and fair pay. It is beyond dispute that AI is here, now we must decide how to use it responsibly.

[27] Liu, J., Niu, Y., Jia, Z., & Wang, R. (2023). *Assessing the Ethical Implications of Artificial Intelligence Integration in Media Production and Its Impact on the Creative Industry*. MEDAAD, 2023, 33-39.

[28] Frías, C. L. (2024). The Paradox of Artificial Intelligence in Cinema. *Cultural Digital*, 2, 5-25. Furious 7. (n.d.). Box Office Mojo. https://www.boxofficemojo.com/title/tt2820852/