Lights, Camera, AI:

An Exploratory Analysis of Generative AI in the Film Industry

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Abstract

The understanding and application of generative AI has skyrocketed in recent years and has exhibited profound potential for use in everyday life. This study investigates the contributions and ethical implications of implementing generative AI in modern film production. Using evidence from Hollywood figureheads, scholarly work from Nantheera Anantrasirichai, David Bull, Akshat Bhatnagar, and relevant business articles, this study examines the different perspectives on machine learning in the film industry relating to effectiveness and ethical concerns. Artificial intelligence is being utilized within the film industry through important routes like VFX, imaging, and scriptwriting. Notable AI technologies like Wonder Studio, Midjourney, and ChatGPT have proven to be cost-effective, efficient, and reliable. However, the reliance on these technologies brings to light the number of ethical implications ranging from copyright protection to employment security. Future research can account for advancements in generative AI as they continue to shape the film industry and investigate the correlated ethical concerns.

Lights, Camera, AI: An Exploratory Analysis of Generative AI in the Film Industry

There is no doubt that the advancement of recent artificial intelligence and machine learning technologies is being leveraged in modern film production. The outstanding science fiction film *Dune: Part Two* used a machine learning model to change the eye color of the fictional Fremen characters to blue. Paul Lambert, visual effects production supervisor for *Dune: Part One* and *Dune: Part Two* describes the implementation:

> We have a multitude of different techniques we used in this film, one of those being that because we had a lot more Fremen characters, we have a lot of eyes to make into that beautiful blue, and for much more of the film than in the first one, over a thousand shots. We came up with a different technique, using what we'd learned before from the hundreds of blue eye shots in the first movie and creating a machine learning model, an algorithm trained from those 'Dune' shots to find human eyes in an image, which would then give us a matte for the different parts of the eye. We then used this multi-part matte to tint the eyes blue. Some worked better than others, those others we did by hand. It actually went full circle sometimes, in that we had to take out some of the blue eyes that got generated in the non-Freman characters, rather than add them, as the algorithm would just find eyes, whether they were Freman, Harkonnen or Sardaukar! But, it was a brand new technique, getting that done (Failes, 2024).

Over the years, technological advancements have undoubtedly shaped the everyday lives of individuals and organizations on a global scale. Recently, vast advancements in artificial intelligence (AI) have led to practical efficiencies in areas such as automation, facial and voice recognition, complex problem-solving, and much more. More specifically, generative AI can be leveraged within the modern Hollywood film industry for cost-effectiveness and efficiency but is

unfortunately accompanied by ethical concerns regarding employment security and copyright/owner protection.

Background

The production process of movies is undoubtedly an intricate and strategic process. Quality films are comprised of complex elements and processes, ranging from lighting, cinematography, sound design, visual effects (VFX), casting, set design, scriptwriting, costuming, and much more. Though these processes can become extremely costly and time-consuming, the return value can be far more rewarding. So far, the highest grossing film in modern Hollywood, without accounting for inflation, is *Avatar* (2009) at nearly three billion dollars, globally, in 2024 (*Top Lifetime Grosses,* 2024). The film took over a thousand people to complete with a collective budget and marketing cost of just under $400 million (Dickey, 2009; Quittner, 2009). Carefully crafted movies like *Avatar* (2009) collectively maintain a prominent annual contribution to the United States economy. According to the Motion Picture Association, "The film and television industry supports 2.74 million jobs, pays out $242 billion in total wages, and comprises over 122,000 businesses" (*Driving Local Economies,* 2024). Due to the advancing technology of AI, machine learning can be utilized within the film industry to contribute to the massive, growing economy behind it.

Regarding AI, modern machine learning has shown prominent growth and usage in 2024, specifically in a commercial setting. In a survey conducted by McKinsey & Company, nearly 75% of businesses leverage AI for at least one task or aspect of functionality (Haan, 2024). This means that many professional services and commercial exchange in everyday life can be somewhat connected with the usage of artificial intelligence. To put this in perspective, in terms of financial measurement, MarketsandMarkets is a marketing intelligence organization that

focuses on AI research in businesses. According to one of their recent studies, the AI market size is projected to increase from 214 billion USD to roughly 1.339 trillion USD in the next few years (Haan, 2024). This undoubtedly indicates that the usage and potency of artificial intelligence will skyrocket very soon. Of course, with the abundance of these tools in countless categories, it is inevitable that the modern Hollywood film industry will make use of them and accelerate movie production.

Literature Review

Due to the relatively recent explosion of artificial intelligence and machine learning advancements, the scholarly work surrounding its application in the film industry is somewhat sparse. However, these few scholars give deep and rich insight into the area of study surrounding the use of AI in filmmaking.

In an article covering AI in the creative industries, authors Nantheera Anantrasirichai and David Bull elaborate on the vast application of various technologies. Collectively, the authors believe these technologies "can work more efficiently in conjunction with humans rather than being left to [their] own devices" (2021, p. 608). These tools should be a reinforcement of film production, not a replacement. In doing so, the human craftsmanship of filmmaking can continue to be preserved and appreciated. A notable area of usage revolves around assisting music generation. Anantrasirichai and Bull write, "The process generally involves using ML algorithms to analyze data to find musical patterns, e.g., chords, tempo, and length from various instruments, synthesizers and drums. The system then suggests new composed melodies that may inspire the artist" (2021, p. 610). Evidently, these generative techniques may not be used for direct implementation. As the authors state, the phrases would simply be used for inspiration rather than full-scale composition, leaving final decision and direction up to the artist themself.

In terms of film production, this can be leveraged by music supervisors to bring variety into the techniques they employ in the scoring process of a movie.

In a study over artificial intelligence in the media industry, author Akshat Bhatnagar discusses a term known as Synthetic Media:

> The term Synthetic Media refers to any piece of media, be it video, audio, image, text, that has either entirely been created using artificial intelligence algorithms or has been modified or manipulated using artificial intelligence algorithms. This includes things like Deepfake videos, speech synthesis, style transfer, photo restoration, colourisation, text generation, voice cloning, music generation and many others (2022, p. 7).

It is evident that there are numerous applications of generative AI. Though some may be more useful and worthwhile than others, the possibilities are seemingly endless. Surrounding deepfake technology, Bhatnagar writes, "It allows for complex features like natural looking duplication…with a video of yourself that contains that motion [and] just a single still image of the target subject" (2022, p. 10). This technique can be leveraged in the film industry by aging and de-aging characters or preserving memorable cast members that have passed away. In *Rogue One: A Star Wars Story* (2016), young Princess Leia's face and facial movement was shaped in part by deepfake technology to replicate the original character, preserving that recognizable, nostalgic Leia. Another interesting program is one that utilizes machine learning for frame interpolation, a method of converting video framerates from choppy and slow to high and smooth. Bhatnagar states, "it can make a video 10 to 20 times smoother…For example, a choppy 12 fps video can be converted into a smooth 120 fps or even 240 fps video" (2022, p. 17). There is a recognizable application of this technology in the film industry with most modern movies. There are countless films that contain fascinating slow-motion scenes that require expensive,

industry-standard equipment for high-framerate processing. With this revolutionary advancement in frame interpolation, there is no need for expensive high-speed equipment. Although the current potential of these programs is being explored, there are cases of high-stakes applications deep within the Hollywood film industry today.

Notable Technologies

There are a variety of AI tools including visual and text-based technologies that are being used to facilitate the development and production process of movies. These resources are user-friendly, cost-effective, and extremely efficient.

Wonder Dynamics is a company out of Los Angeles, California founded in 2017 that specializes in the creation of accessible AI tools that assist with VFX and CGI in the creation of movies ("Wonder Dynamics Officially Launches Wonder Studio," 2023). Well-known director, producer, and screenwriter Steven Spielberg is displayed as a member of the company's advisory board, which is a huge vouch from the film industry. CEO Nikola Todorovic and President Tye Sheridan recently came out with a new tool known as Wonder Studio, released in July 2023 (Ransbotham, 2024). Wonder Studio is a machine learning tool that enables filmmakers to create films using CGI characters through affordable and user-friendly software that encompasses a variety of useful features. First off, there is no need for expensive CG hardware or production equipment such as a motion capture suit. With the use of Wonder Studio, a movie's characters can directly replace actors and their body movements on screen without the cost and post-production editing required with the use of a motion capture suit. Moreover, this tool eliminates and automates the tedious post-production editing. After analyzing given camera footage of an actor, Wonder Studio captures the actor, lighting, compositing, and camera movement. Then, the AI automatically and directly lights, animates, and composes the character into the scene. The

Russo Brothers are using Wonder Studio in their upcoming film *The Electric State* (2025) starring well-known actor and actress Chris Pratt and Millie Bobby Brown with recognizable names like Giancarlo Esposito, Woody Harrelson, and many others. According to a Business Wire article, Joe Russo says, "Wonder Dynamics' technology is a game changer for filmmakers, and it's the right step towards a future in which AI can be a powerful and additive tool in an artist's repertoire. I'm excited to see how this impacts the next generation of filmmakers" (*Wonder Dynamics Officially Launches Wonder Studio*, 2023).

Another significant program is an AI image generation tool known as Midjourney. Midjourney is a software and company based out of San Francisco, CA that generates detailed images from user prompts. These images can be hyper-realistic or fit a style or format based on the user's description and can encompass a variety of (appropriate) characteristics. These images can be used in countless different ways, but it holds a remarkable application in the film industry. A user on reddit by the name of "SpagCol" posted images of remade movie posters including *Avatar: The Way of Water* (2022), *Oppenheimer* (2023), and *Dune: Part Two* (2024) under the subreddit "r/graphic_design." The astonishing background images were created in less than a minute using Midjourney's imaging AI, then the user added relevant text and organization logos. This goes to show the great potential that AI tools like these can hold in a piece of the production pie as small as movie poster creation.

Ethical Considerations

Although the use of generative AI in the modern film industry can prove to be beneficial, it raises various ethical concerns. Unfortunately, efficient and cost-effective technology has a strong potential to overshadow the performance of employees and workers in the film industry,

rendering them obsolete. Additionally, the usage of AI tools trained on large sets of data can raise concerns dealing with content preservation and licensing issues.

Efficient and viable AI models can, unfortunately, replace or displace employees in the film industry due to cost and performance comparison. Very recently, Hollywood's actors and unions decided to go on strike in fear of AI taking their jobs. In a news article from Reason Magazine, author Peter Suderman describes their concerns: "The unions were concerned about the usual issues…but as much as anything else, they feared for their jobs, worrying they would be made obsolete by generative AI" (2024). Because of the countless sectors in filmmaking that AI can be leveraged, numerous jobs are becoming more and more threatened. Unfortunately, these artists and their crafts become almost worthless when an AI tool can do their job much faster for little to no cost. Additionally, if workers are not outright replaced by this technology, they might still be required to operate under its dominion. Employees do not want to work for artificial intelligence, and they certainly do not want to be replaced by it. In a news article from The Guardian, author Adrian Horton describes VFX supervisor and cinematographer Jim Geduldick's perspective:

> "Are they implementing generative models that are going to speed up both the business and the creative side of what we're doing? Yes," he said. "But I think that there is no generative model out there today that doesn't get touched by artistic hands to get it to the next level. That is for the foreseeable future" (2024).

Instead of opposing the use of artificial intelligence in fear of its expanding capabilities, filmmakers should absolutely, with regulations, implement these exceptional tools in their work. Producing movies alongside this advancing technology is undoubtedly the best route to take.

After all, machine learning is useless without the attention of its creator or user, thus leaving the decision of usage and restriction up to the workers themselves.

The production methods of artificial intelligence are questionable and raise concerns surrounding copyright and validity. In the previously mentioned news article from The Guardian, the author discusses cinematographer and director Kathryn Brillhart's input: "Some studios are like, 'We don't even feel comfortable using gen AI in storyboards and concept art, because we don't want a hint of any theft or licensing issues to come through in the final,'" (Horton, 2024). Because machine learning models are trained on large datasets, the validity and originality of the content it produces is nonexistent. This is generally where the skepticism of generative AI stems from. No content from AI is *truly* original; the output is simply a regurgitation of data concentrated around user input. Thus, eyebrows begin to raise when a machine learning algorithm displays anything that closely resembles the authentic work and craftsmanship of an original artist. The lack of copyright claims can potentially lead to a lot of messy situations regarding AI and ethics, especially in the film industry. In extreme cases, this may lead to lawsuits and court cases that revolve around genuine concerns with copyright, authenticity, and content ownership regarding the use of machine learning generation. Horton goes on to describe an event caused by using generative AI in the creation of a documentary: "Antell and several colleagues formed the Archival Producers Alliance (APA), a volunteer group of about 300 documentary producers and researchers dedicated to, in part, developing best practices for use of generative AI in factual storytelling" (2024). Due to the historical foundation of these types of films, the group was created to preserve accuracy and prevent clouding the historical records that these documentaries are composed of. If artificial intelligence was used to replicate authentic images or documents, the purpose of these types of films would be washed away.

Concluding Remarks

Artificial intelligence and machine learning is undoubtedly a rapidly growing field of technology that will reshape countless aspects of life. The film industry is a vast expansion of artwork that is strongly influenced by many different foundational technologies. Though the use of AI in modern film production is relatively recent, the projected growth with its assistance over the next few years is astonishing. Unfortunately, this boom in advancement is accompanied by ethical implications surrounding job security, copyright, and content preservation. The future of the film industry holds an unknown weight between ethics and efficiency, but society must not forget that these algorithms were trained on the breathtaking artisanship of powerful, creative minds.

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