How has the evolution of visual effects technologies blurred ethical borders?

Abstract

This report was inspired by the brilliant science fiction episode (‘Joan is Awful’, 2023) and identifies the ethical implications of deepfake technology in the visual effects industry. It explores how new technologies blur the lines between reality and imagination and present ethical concerns like consent and authenticity in new technologies. Balancing advances and concerns, this report examines propositions for ethical filmmaking.

Key words

Visual Effects, Filmmaking, Green Screen, Virtual Production, Artificial Intelligence, Deepfake, Ethics

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1. Introduction

The film industry has gone through significant changes with the evolution of visual effects (VFX). In the modern film industry, VFX play an essential role cinematography that enriches the film itself and the cinematic experience. From practical effects to advanced digital techniques like green screen, computer-generated imagery (CGI), virtual production and deepfake technology, the boundaries of what is possible on screen have been blurred. These changes allow creators to breathe life into infinite worlds and characters but also enhance the audience experience. However, these technological advancements have brought significant ethical concerns, especially consent and authenticity. This report focuses on how VFX technology has evolved and the ethical dilemmas that have come with it, proposing solutions to these concerns.

2. Literature Review

The literature on visual effects (VFX) comprises both the evolution of creativity and the ethical dilemmas caused by new technologies. VFX is defined as digital manipulations and enhancements that seamlessly blend with the real-world footage by Dinur (2023, p.12). He stresses ‘photorealism’ as a crucial concept, highlighting why VFX artists constantly aim to create their works as realistic as possible. The key concepts in the contemporary cinema are green screen and computer-generated imagery (CGI). Palanimurugan (2024) provides concept of green screen and its features with advantages and limitation, while Polozuns (2013) introduces overall information of CGI in cinematography. Both argue that each technology has brought significant innovation to the film industry, enabling creators to bring their imagination into films. As a result, Abbott (2006, p.90) said that audiences have become increasingly

familiar with CGI, and Peng (2024, p.129) mentioned it enhances audiences' visual experience as well as improves production efficiency. With the continuous development of VFX technologies, virtual production emerged by augmenting and replacing traditional VFX workflows (Zwerman and Okun, 2023, p.5).

Moving on to the latest technology, the application of artificial intelligence (AI) in the film industry is explored by Aslanyürek and Aycan (2024) and Ali and Butt (2024). They make a similar contention that using of AI not only improves the efficiency and quality of creations but also raises significant ethical concerns. Using AI as a tool to assist for analysis rather than accepting its idea by itself is suggested by Sun (2024, p.3). Extending application of AI, the term deepfake is explained by Westerlund (2019, p.39) as videos created using artificial intelligence software that manipulates images and videos to produce fake videos that look genuine. According to Mittal *et al.* (2024, p.4), this technology enables seamless facial replacement, recreation of deceased actors and de-aging. The ethical concerns and countermeasures accompanying deepfake are discussed from various approaches by Gaur (2022) and George and George (2023).

This following report examines the concept and influence of each technological development to understand the underlying ethical implications in the industry. Based on these norms, ethical concerns will be addressed with a case study of real-world application. Additionally, methods to ameliorate these issues will be discussed.

3. Evolution of Visual Effects Technologies

3.1. Green Screen

Green screen, also known as chroma keying, is a technique that separates subjects from the background by distinguishing green using software. Compared to traditional tools like rotoscoping, this technique makes faster and more accurate extraction from the background (Dinur, 2023, p.53). It is crucial to set proper lighting to film better footage while minimizing potential problems such as a green spill, in which the green light is reflected on the subject. Green screen has evolved in parallel with the development of film and video technologies. Now, it has become an essential element of the VFX industry, allowing filmmakers to create whatever they want without practical shooting or real-world environments. (Palanimurugan, 2024)

3.2. CGI

All imagery that has been created using software is defined as computer-generated imagery (CGI) in Singh's report (2024, p.168). Audiences often confuse CGI with VFX in general, but technically, it stands only for 3D-generated graphics. This technology not only enables filmmakers to make their imaginations a reality but also improves production efficiency. CGI has become increasingly familiar to audiences as a representative element of the film industry. Accordingly, the aim of CGI has shifted to how 'realistic' they look which contributes to enriching the audiences' visual experience (Dinur, 2023, p.8; Polozuns, 2023; Abbott, 2006, p.90).

3.3. Virtual Production

In modern cinematography, virtual production emerged with the application of real-time digital technologies. An LED wall with realistic light-bounce, body and face tracking with motion capture and real-time chroma key reduced potential problems that can occur in post-production (Zwerman and Okun, 2023, pp.6-18). It enables filmmakers and actors to visually interact with the 3D environment on the spot and helps make decisions about the production process in real-time (Autodesk, 2009, p.5). Bennett and Carter (2014, p.85) mentioned that virtual production provides greater creative options and a new interactive environment in the filmmaking process. Despite the advantages of virtual production, it is not applied as frequently as the conventional methods due to potential challenges.

3.4. Artificial Intelligence and Deepfake

The latest technology, applying artificial intelligence (AI) to film production, has brought significant changes to modern filmmaking industry. By applying AI tools for various approaches such as pre-visualization of scenes, lighting simulation, content-aware image rendering and automatic shot matching, filmmakers attained alternative creative tools for cinema (Aslanyürek and Aycan, 2024, pp.89-90).

With the advent of AI technology, deepfake, which is a video that appears genuine but is actually a fake, created by AI technology, developed together. This technology allows filmmakers to recreate scenes in movies, star long-dead actors and age or de-age the actor’s face. It can improve the quality of videos to professional levels; however, it accompanies potential ethical problems (Westerlund, 2019)

4. Ethical Implications of Technological Advances

4.1. Potential Concerns

With technological advances, the VFX industry encounters rapid and diverse changes, raising ethical concerns.

One of the potential concerns is job displacement. Particular roles or departments can become redundant or obsolete by new technologies. Predicting how the industry will be affected by new technologies is difficult, but it is undoubtedly undergoing significant changes (Dinur, 2023, p.185). Also, Wan (2024, p.1) mentioned that virtual production revolutionizes traditional production and it breaks the process of production stages. According to both perspectives, shifts in conventional workflow are inevitable, which can cause unemployment or changes in VFX roles.

It is necessary to train AI with existing faces and audio, and this work can proceed without the consent of the person whose image and voice are involved. In this process, consent and privacy issues arise. This issue is significant as anybody can approach to AI and create fake video using other's data. The episode 'Joan is Awful' (2023) provides a fictional yet raise an ethical implication. It depicts a story where an ordinary woman's life is edited into a TV show by shifting her face into a famous actress's. She agreed to the consent to use the streaming service without being aware of the consent article. Consequently, her privacy violated, devastating her daily life. By underscoring the need for ethical guidelines and safeguards in the use of such technologies, this narrative points out the potential for abuse and the erosion of personal privacy.

In the context of consent and privacy, deepfake can eventually erode public trust in media authenticity. People tend to believe what they see and hear; however, as videos and audios

generated by deepfake become indistinguishable from reality, people might become skeptical of all media content. Even now, productions might be using deepfake technology without disclosing it. Gaur (2022, pp.104-105) insists that fake videos might end up being archived and historically considered as truth, such as media news. In his view, it can severely destroy people's trust in media.

4.2. Real World Application – *A Killer Paradox*

In February 2024, the TV series *'A Killer Paradox'* (2024) launched on a streaming service. A stand-in actor played the younger version of the protagonist. He looked incredibly resembling the main actor, then it drew attention on social media. About this, the director Lee (2024) revealed the use of deepfake in the interview 'where did you find the child actor? It is actually CG.' He said that although the child actor and the main actor play the same role, they are technically different people. This could disrupt the immersive experience of the film. To minimize this gap, he applied deepfake to alter the child actor's face. This approach can be linked to 'photorealism' which the VFX industry constantly strives to make as realistic as possible. Even though they got consent from both the main actor and child actor, it was not disclosed to audiences in the video. Thus, it can potentially erode public trust in the media. To maintain trust and transparency with the audience, Singh (2024, p.141) contends ethical guidelines should be established. Moreover, in the case of the child actor, although he performed and was filmed through the camera, his actual appearance did not appear in the final shot. This situation raises potential concerns about stand-in actors' careers. It is also discussed in Lees' (2024, p.121) report, with the question about what remains of the original performance and what the moral and legal rights of that performer are.

4.3. Countermeasure for Ethical Filmmaking

The widespread use of AI and deepfakes has led to various measures to combat them. In Singapole, any content considered false can be removed by the social media under government empowerment. Ironically, AI is also used to distinguish between AI-created and authentic content. Gaur (2022, pp. 108-110) suggested using detection tools such as video authenticator, biological signals and media authentication. Additionally, methods like digital watermarking, blockchain verification and subtle artifact for detection may help identify manipulated media (George and George, 2023, pp.59, 61). Both highlight the importance of alleviating these ethical dilemmas by increasing public media awareness as well as implementing various technologies. To prevent such issues, using AI as a tool to assist with takes like picture or data analysis rather than using for creative works should be ideal (Sun, 2024, p.3).

Following guidelines can be suggested to mitigate the ethical challenges caused by the application of deepfake in VFX:

- **Consent:** Make sure to get explicit consent from people whose likenesses you are using, especially if deepfake is used.
- **Transparency:** Be transparent about the use of AI and deepfake so audiences know what is true and what is not.
- **Privacy:** Ensure that deepfake does not create unauthorized depictions of individuals.
- **Liability:** Establish concrete verification processes to prevent the misuse of deepfake.
- **Regulation and Compliance:** Follow legal standards and regulations concerning the use of AI in VFX industry.

5. Conclusion

Various technologies such as green screen, CGI, virtual production and AI have contributed to the evolution of the VFX industry. They have significantly shifted the atmosphere, with great enhancement of visual in the film. As the VFX industry pursues a ‘photorealistic’ appearance, the application of some technologies can be double-edged. However, there is no doubt that they have incredibly enhanced the quality of film and the audiences’ cinematic experience.

Due to the time limitations and the recency of these issues, the guideline suggested in this report may not be sufficient. Thus, filmmakers should earnestly discuss and consider these ethical concerns and make efforts to establish concrete guidelines to maintain a healthy VFX industry.

6. Bibliography

- Dinur, E. (2023) *The filmmaker's guide to visual effects: The art and techniques of VFX for directors, producers, editors and cinematographers*. 2nd ed. London, England: Routledge.
- PALANIMURUGAN, P., 2024. Challenges and Solutions in Green Screen Post-Production: A Narrative Review.
- Abbott, S., 2006. Final frontiers: Computer-generated imagery and the science fiction film. *Science Fiction Studies*, pp.89-108.
- Polozuns, A., 2013. Computer Graphics in Cinematography.
- Peng, M., 2024. The application of digital media technology in the post-production of film and television animation.
- Bennett, J. and Carter, C., 2014. Adopting virtual production for animated filmmaking. In *Proceedings of the 7th Annual International Conference on Computer Games, Multimedia and Allied Technology* (pp. 81-86). Global Science and Technology Forum (GSTF).
- Zwerman, S. and Okun, J. A. (eds.) (2023) *The VES handbook of virtual production*. Oxford, England: Focal Press.
- Wan, X., 2024. The Potential of Virtual Production Based on the Special Effects of Films. In *SHS Web of Conferences* (Vol. 193, p. 01013). EDP Sciences.
- Aslanyürek, Y. and Aycan, E., 2024. CINEMATIC FUTURES: THE IMPACT OF AI ON THE CINEMATOGRAPHY. *İnönü Üniversitesi İletişim Fakültesi Elektronik Dergisi (İNİF E-Dergi)*, *9*(1), pp.75-94.

- Ali, M. and Butt, A. (2024) 'Artificial Intelligence and Indian Cinema', in Sabahrwal D., Sood R. and Sood S. (2024) *Media and Al: Navigating The Future of Communication*. Shahdara, Delhi: Post Script. Available at: https://www.researchgate.net/publication/381229239_Media_and_Al_Navigating_The_Future_of_Communication (Accessed: 15 June 2024)
- Singh, A., (2024) 'The Dark side of Entertainment Technology', in Sabahrwal D., Sood R. and Sood S. (2024) *Media and Al: Navigating The Future of Communication*. Shahdara, Delhi: Post Script. Available at: https://www.researchgate.net/publication/381229239_Media_and_Al_Navigating_The_Future_of_Communication (Accessed: 15 June 2024)
- Sun, P., 2024. A Study of Artificial Intelligence in the Production of Film. In *SHS Web of Conferences* (Vol. 183, p. 03004). EDP Sciences.
- Gaur, L (ed.) 2022, DeepFakes : Creation, Detection, and Impact, Taylor & Francis Group, Milton. Available from: ProQuest Ebook Central. [16 June 2024].
- Mittal, S., Joshi, M., Vats, P., Upadhayay, G.M., Vats, S.K. and Kumar, S., 2024, March. Virtual Illusions: Unleashing Deepfake Expertise for Enhanced Visual Effects in Film Production. In *2024 11th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO)* (pp. 1-6). IEEE.
- Westerlund, M., 2019. The emergence of deepfake technology: A review. *Technology innovation management review*, *9*(11).
- Lees, D., 2024. Deepfakes in documentary film production: images of deception in the representation of the real. *Studies in Documentary Film*, *18*(2), pp.108-129.
- George, A.S. and George, A.H., 2023. Deepfakes: The Evolution of Hyper realistic Media

Manipulation. *Partners Universal Innovative Research Publication*, *1*(2), pp.58-74.

- Autodesk (2009) *The New Art of Virtual Moviemaking.* Available at: https://images.autodesk.com/apac_grtrchina_main/files/the_new_art_of_virtual_moviemaking_-_autodesk_whitepaper1.pdf (Accessed: 18 June 2024).
- 'Joan is Awful' (2023) *Black Mirror*, series 6, episode 1. Zeppotron. Available at: Netflix (Accessed: 18 June 2024).
- *A Killer Paradox* (2024) Showbox and Let's Film. Available at: Netflix (Accessed: 18 June 2024).
- Lee, C. (2024) 'where did you find the child actor? It is actually CG'. Interview with Changhee Lee. Interviewed by Gayoung Kim for Edaily, 14 Faburary. Available at: https://www.edaily.co.kr/news/read?newsId=01226726638790520&mediaCodeNo=258 (Accessed: 18 June 2024).