VFX Technology and Cinematography

Dinur, E. (2023) The filmmaker's guide to visual effects: The art and techniques of VFX for directors, producers, editors and cinematographers. 2nd edn. London: Routledge.

- 1. Visual effects (VFX) are digital manipulations and enhancements of the footage, and happen primarily during post-production (p.7)
- CGI stands for Computer Generated Imagery. People (and the media) use the term 'CGI' to talkabout visual effects in general, but in professional VFX discourse CGI has a much more specificmeaning. It is used to make a clear distinction between VFX elements that were created 'artificially' in the computer and real-world elements that were shot with a camera. (p.8)
- 3. Visual effects are constantly being judged by how 'real' they look. This is a vital part of the discourse surrounding VFX, and for a good reason—few filmmakers will be content with VFX that damage the believability and credibility of their movie. Yet there is something paradoxical in talking about the 'realism' of VFX when in fact nothing in a movie is real. (p.12)
- 4. <u>Movies are fake, but at least they are 'real' in the eyes of the camera. In other words, anything</u> <u>captured by the camera is, by default, photoreal. Visual effects are not. This is why VFX artists</u> <u>constantly strive to make their work as photoreal as possible.</u> (p.12)
- 5. When visual effects are used judiciously and with respect to real-world physics and optics, they become an integral and coherent part of the movie and its story. But when the temptation to use every available VFX toy crosses the fragile border of artistic sensibility, they are likely to become an irritating excess that throws the film off its balance and the viewers off the story. (p.14)
- 6. **Befo**re digital technologies took center stage, visual effects were achieved through a combination of on-set and in-camera practical work, animatronics, stop-motion, painted glass panels, optical tricks, and chemical film manipulations. (p.16)
- 7. Green screens are not a fashion, nor a style; they are simply a means to allow cleaner and faster separation of subjects. (p.52)
- 8. Many of those problems can be minimized, or avoided altogether, by properly setting up and lighting the screen and the subject on set. (p.52)
- 9. The idea of a green screen is simple: since the computer can analyze color with great precision, placing a background of a consistent color (assuming that color does not appear anywhere on the subject) makes it easy for the computer to distinguish between the subject and the background, and provides a fast way to separate the subject without rotoscoping. (p.53)
- 10. Green spill (or blue, in case of a blue screen) is an unavoidable side effect, although it can certainly be minimized on set by following a few simple rules. (p.56)
- 11. Brightening the actor would make him feel detached from the environment, brightening just his face would make him look weird, and brightening the environment instead would create a mismatch with the first person POV shots in the sequence. (p.56)
- 12. This is not an attempt to envision visual effects a hundred years from now. I leave this type of prediction to sci-fi writers. Instead, I am simply pointing out technologies and trends that are

already happening and are likely to affect the way we create and use visual effects in movies and TV in the near future. (p.184)

- 13. Roto and green screens will not disappear overnight, but eventually, as lightfield technology becomes widespread, they will. The demise of roto and green screen will be, I think, a long overdue and much welcome change. (p.185)
- 14. It is hard to predict how the industry will be affected if roto, extraction and tracking work becomes redundant or obsolete, but it will no doubt go through some major changes. (p.185)

PALANIMURUGAN, P., 2024. Challenges and Solutions in Green Screen Post-Production: A Narrative Review.

- 1. Green screen technology, also known as chroma keying, has revolutionized the film and video production industry, enabling dramatic visual effects and environmental effects but this transformative technology is not without its challenges, especially after filming. (p.147)
- 2. The roots of green screening technology can be traced back to the early experiments in filmmaking, where filmmakers sought ways to achieve realistic visual effects and structures. (p.148)
- 3. Over the years, green screen technology has evolved in parallel with advances in film and video production. The transition from analog to digital technologies has further expanded the possibilities of green screen compositing. (p.148)
- 4. <u>Chroma keying is the process of removing a particular color (usually green or blue) from the background and replacing it with another image or video.</u> (p.148)
- 5. Proper lighting is key to green screen success. Lighting behind the green screen and on the subject is also important to reduce shadows, color changes, and dilation. (p.148)
- 6. <u>Green screen technology has become an integral part of modern filmmaking, providing a great</u> <u>canvas for storytelling. Its importance is emphasized by its ability to transport people and audiences</u> <u>to exotic locations, historical moments and iconographic events.</u> (p.148)
- 7. Green screen technology has certainly revolutionized filmmaking and video production, creating endless creative possibilities. But the path from shooting on a green screen to a polished, simple final product is not without its challenges. (p.149)
- One of the major challenges in green screen post manufacturing is contamination spills. It pours when the color of the green screen is reflected on the subject or actors, creating a green or colored edge. (p.149)
- 9. The use of AI in post-green screen manufacturing not only speeds up the process, but also improves mix quality by reducing human error and achieving more accurate results. (p.153)

Abbett, S., 2006. Final frontiers: Computer-generated imagery and the science fiction film. Science Fiction Studies, pp.89-108.

- 1. CGI has become increasingly familiar to audiences and domesticated by its use to produce invisible effects such as crowd scenes, color alteration, and weather effects, as well as by its use in television. (p.90)
- 2. The computer technology proved incredibly malleable at smoothly 'morphing' from one live-action image to another suggesting a seamless and painless transformation. (p.93)

Polozuns, A., 2013. Computer Graphics in Cinematography.

- 1. The development of computer graphics dramatically rocketed up since the first computer animation effect was used in a movie. The industry of cinematography can hardly be imagined without visual effects and computer generated imagery. (p.1)
- 2. These days, digital effects are so intelligent and delicate that it is hard to recognize the unreality of them, but it should be taken into consideration that it was not always like that. (p.3)
- 3. <u>The new digital era has strongly changed in comparison with traditional production methods of</u> <u>films or advertising videos, bringing new possibilities and potentials to the industry of</u> <u>cinematography.</u> (p.7)
- 4. In addition, the growing interest consequently causes higher demand for wealthier technologies, more variable methods of creating visual effects, more complex moves of the camera and so on; it means that in order to continue satisfying humans' desire for entertainment and new eyeful, money should undoubtedly be invested into development of these technologies. (p.7-8)
- 5. Customary visual effects in production of movies or commercial videos used to involve practical properties like explosions, fire, rain, waterfall, wind, etc. which were made manually from the raw materials and with the help of mechanisms by a crew of specialists in studios or in particular outside locations. In the modern digital world VFX is all about computer generated imagery that is created by 2D, 3D environments and particle systems, or by CG dynamic forces that can be applied to hard or soft body objects and particles. (p.11)
- 6. Usually when we watch a movie, we do not even think about the background of the movie, about how the CG artists reach one or another effect or how they modelled and animated the particular objects. We are constantly saying: 'It is incredible how the technologies had improved!', but we should not forget that without skillful animators and VFX designers no one would be able to experience and witness these improvements. (p.12)

Maddock, D., 2019. Reframing cinematography. Media Practice and Education, 20(1), pp.44-66.

- Baudrillard and Coulter have made a similar conclusion that digital technologies have changed films, suggesting there was filmmaking before the digital revolution and filmmaking after and that these are remarkably different things. (p.54)
- 2. The history of virtual imagery and cinematographic authorship began to diverge with the introduction of computers to the filmmaking process. (p.60)

 During the 1990s, major advances in computer-generated imagery (CGI) led to a flood of movies that incorporated the technology to greater and greater degrees, with varying levels of success. Now, CGI is generally accepted as standard practice, whether the digital effects are applied in spectacular, eye-catching style or in a subtler, virtually undetectable manner for 'real world' scenes. (p.60)

Peng, M., The application of digital media technology in the post-production of film and television animation.

- 1. The rapid development of science and technology, digital media technology has become an indispensable part of film and television animation production. From simple image processing to complex special effects synthesis, digital media technology has brought revolutionary changes to film and television production. (p.129)
- It not only improves the production efficiency but also enriches the audience's visual experience. Therefore, it is of great significance to discuss the innovative application and prospect of digital media technology in the post-production of film and television animation. (p.129)
- 3. Through digital special effects software, special effects artists can create realistic virtual scenes, characters, and actions to make the visual effects of the film more striking. (p.130)
- 4. In the post-production of film and television animation, the innovative application of digital image processing technology has brought revolutionary changes to the entire production process. With the continuous advancement of technology, digital image processing has evolved from simple color correction and image restoration to complex scene synthesis, dynamic tracking, and virtual reality and other high-end applications. (p.131)
- 5. The use of this technology not only makes the audience feel like being in a new world but also promotes the development of the film and television industry to a higher level. (p.131)
- 6. These special effects not only enhance the visual effects of the film but also immerse the audience in a fantasy world full of imagination. (p.132)
- 7. With the continuous progress of science and technology, the development trend of digital media technology in the late production of film and television animation is increasingly obvious. In recent years, with the rapid development of artificial intelligence, big data, cloud computing, and other technologies, the application of digital media technology in the post-production of film and television animation has also shown new characteristics. (p.132)
- 8. With the continuous development and innovation of digital media technology, the post-production of film and television animation has also ushered in unprecedented changes. These changes are not only reflected in the improvement of production efficiency but also in the optimization of the quality of works and audience experience. (p.134)
- Looking forward to the future, the development prospect of digital media technology in the later stage of film and television animation production is still broad. As technology continues to advance, we can expect more efficient and intelligent production tools to continue to emerge, providing producers with more choices and possibilities. (p.134)

Boutellier, A.D., 2019. Digital Disruption: Redefining Cinematography in the Virtual Age. University of Exeter (United Kingdom).

- There are indeed no limits to what can be created in a computer these days. The gist of Fussfeld Cohen's argument is the question of control over the image: in the virtual environment it is total and complete; in the world of the cinematographer, it is fleeting and cause for constant struggle.
 (p.37)
- 2. The continuous blending of the factual and the virtual world creates an overlap of images whose origin—camera or computer—is nearly impossible to define. (p.43)
- 3. Keating (2014) argues that the trade we call 'cinematography' might fragment into a number of highly specialised positions in the future—of which the DOP could just be one. (p.44)

Longo, R., 2014. Kristen Whissel Talks about Spectacular Digital Effects: CGI and Contemporary Cinema. Film Quarterly, 68(1), pp.83-86.

1. Spectacular CGI often functions as 'effects emblems' that give stunning expression to the key themes, anxieties, and desires of both the films in which they appear and the historical moments in which they were made. (p.85)

Virtual Production

- 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).
- Virtual Production is a rapidly growing approach to filmmaking that utilises 3D software, virtual camera systems, and motion capture technology to visually interact with a real-time virtual environment. (p.81)
- Englishing the use of virtual production, filmmakers can visually interact with a 3D virtual environment which allows them to make decisions about the production process and implement these decisions in real-time, much like a live-action production. (p.81)
- 3. James Cameron's Avatar is considered the 'birthplace' of virtual production. To create Avatar, James Cameron's team developed new technologies and techniques for incorporating motion capture and virtual cameras into the production process, permitting the director to work with digital beings in a manner more closely aligned to live-action filmmaking. (p.81)
- 4. Prior to contemporary postproduction technologies, if a director wanted to shoot a special effect or add a creature to a shot, they would have to figure out a way to shoot it on camera. This imposed limitations on what could be realistically achieved. (p.82)
- 5. Virtual production solves the issue of the director being disconnected from the creative process because it is an interactive and iterative process that starts with previsualisation and continues through to post-production. Virtual production differs from traditional CGI because it is driven by

the director in real-time as opposed to being done by animators and artists in post-production. (p.83)

- 6. One of the key technologies developed for Avatar was a custom tablet computer that could see into the virtual world of Pandora, allowing the director to see the actors as aliens within the CG set in real-time. (p.83)
- 7. Motion capture involves measuring an object's position and orientation in physical space and then recording said information for use in a virtual world developed through 3D programs on computers. (p.83)
- 8. Virtual production offers greater creative options and fosters a new collaborative and interactive environment to explore the filmmaking process. (p.86)

Zwerman, S. and Okun, J. A. (eds.) (2023) The VES handbook of virtual production. Oxford: Focal Press.

- 1. <u>Virtual production is the augmentation or replacement of traditional visual effects or animation</u> workflows by the use of real-time, digital technology. (p.5)
- 2. Live green screen replacement is perhaps the most widely publicized manifestation of virtual production today. In this practice, rather than a traditional green screen, an LED wall is used to substitute for a material environment. (p.5)
- 3. An LED wall offers realistic light-bounce. This ensures the talent, props, and set are responsive to environment lighting. It also eliminates the dangers of visual artifacts left behind from legacy green screen spill or challenging rotoscope work. (p.6)
- 4. By using full-body tracking and facial motion capture, on-set operators can capture a character's performance. The captured data can be stored or immediately transmitted to a character rig, allowing the virtual character to be puppeteered in real-time. (p.8)
- 5. Real-time chroma key integration is one of the most important things in green/bluescreen virtual production. There are many good hardware chroma keyers, and at the time of this writing, one of the best is Ultimatte-12 4k. (p.17)
- 6. While compositing digitally generated set extensions is effective, there are drawbacks to an exclusively post-production-driven process. It can be difficult to create a unified vision when each part of the effect is segmented into departments and temporally siloed. LED volumes offer a return to an 'in-camera' approach for set extensions. (p.19)
- 7. The actors can see the world they are performing in, resulting in more authentic performances and sight lines. (p.21)
- 8. Creative decisions and approvals must be made much sooner, which lengthens the time and money spent in pre-production compared to the traditional film approach. (p.21)
- The virtual production and visual effects teams will be creating 'final pixel' work that can take
 months to create, depending on design complexity, in pre-production instead of in post. (p.22)

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.

- Since the large use of virtual shooting technology in the movie Avatar in 2009 and the use of LED review stage in The Mandalorian in 2019, the film and television industry has paid more and more attention to virtual production in film special effects, and great changes have taken in the mode of production. (p.1)
- 2. Virtual production innovates the traditional production logic and creation mode of film. It breaks the process of pre-production -- production -- post-production of traditional film production. (p.1)
- 3. During the shooting phase, special effects are usually shot through a green screen. Before shooting each scene, the photography, lighting, special effects and other departments need to discuss the following aspects of the shooting. (p.2)
- 4. Most of the films made by virtual production today are science fiction films which are difficult to achieve... Although the virtual production technology is constantly developing, it seems that most of the special effects can be completed through virtual shooting, but in fact, it cannot completely replace the traditional real shooting. (p.4)
- Although virtual production is facing some challenges, it has great development prospects...
 Virtual production is not only a technological change, but also the innovation of the concept of film production. (p.4)

Kavakli, M. and Cremona, C., 2022, March. The virtual production studio concept–an emerging game changer in filmmaking. In 2022 IEEE Conference on Virtual Reality and 3D User Interfaces (VR) (pp. 29-37). IEEE.

- The VPS concept transforms the relationships among display technology, live action, image production, and postproduction (VFX) by causing a qualitative and performative shift in filmmaking. (p.29)
- 2. VP integrates virtual and augmented reality technologies with CGI and VFX using a game engine to enable on set production crews to capture and unwrap scenes in real time. (p.29)
- 3. Until recently, the major problems in VP were listed as the lack of sufficient processing power, communication difficulties between proprietary systems, and the need to make content that would play back in real time at sufficient speed and with sufficient precision. (p.29)
- 4. Heargues that the potential improvements that can facilitate actors' immersion include the ability to control the lighting of the virtual environment in real-time. This is one of the great advantages of using LED walls with a VPS integrated system as light is both emitted by the walls themselves and other sources which are digitally controlled within the same system. (p.32)
- Since traditional filmmaking requires shooting on location and in real conditions, extensive manpower and resources are involved, and thus the budget rises. With VP technology, and VPS in particular, most plates can be completed in the studio. (p.35)

Chanpum, P., 2023. Virtual production: Interactive and real-time technology for filmmakers. Humanities, Arts and Social Sciences Studies (FORMER NAME SILPAKORN UNIVERSITY JOURNAL OF SOCIAL SCIENCES, HUMANITIES, AND ARTS), pp.9-17.

- The traditional script-to-screen method is being abandoned for quick iteration and instant feedback, and this novel technology also enables real-time visual interaction between users and a virtual environment. (p.9)
- Since the 1990s, real-time computer graphics have advanced significantly in narrative filmmaking. Virtual production is a new filmmaking technique that creates narrative films using real-time 3D computer graphics (Kuchelmeister, 2020). (p.9)
- 3. The technology also significantly impacts how live-action films are made and fundamentally alters the pre-production process, which in turn accelerates the feedback and iteration processes associated with the traditional screenplay-to-final-film production process. (p.10)

Maddock, D., 2021. What Is Cinematography in the Age of Virtual Film Production? Posing a New Definition for the Practice of Cinematography. Journal of Film and Video, 73(4), pp.44-58.

- 1. The idea of cinema itself was not even a consideration for the burgeoning group of experimenters trying to obtain the motion image at the time. (p.44)
- Definitions such as this, however, have become increasingly troublesome in recent years with the ever-growing use of CGI in cinema and television, as well as in other newer mediums of video. From 2009 to 2014, the winners for Best Cinematography in a Feature Film at the Oscars were films that contained a large CGI component. (p.47)
- 3. The production gave rise to other controversies: if the majority of the film was designed and rendered in the computer, where do we divide the responsibilities or assign credit for its excellence? (p.48)

AI

Aslanyürek and Aycan, 2024, 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.

- 1. 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. (p.75)
- 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. (p.75)

- 3. 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: Al-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: Al-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. (p.89-90)

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_o f_Communication (Accessed: 15 June 2024)

- 1. Al is used in post-production to automate or expedite processes such as color grading and special effects. Programs like Adobe Creative Cloud use AI technology to speed up typical post-production processes. Al is making advances in film production in Indian cinema. Al is being applied to various aspects of production with different goals. AI tools help production teams take smarter decisions while reducing costs and enabling the creation of creative scenes in films. AI is being used in post- production to analyze facial expressions and body language of actors to get better direction during dubbing and final filming of the scenes. AI helps to assess the emotional intent behind acting and identify even the smallest details directors aim to capture, allowing tighter control over performance. (p.22)
- 2. The use of AI and machine learning in cinema raises a range of ethical considerations, such as the potential for deepfakes or other manipulations of reality. (p.25)

- 3. The use of AI in cinema raises a range of ethical and practical challenges, including job losses, biases, and data privacy concerns. These challenges must be addressed and carefully considered to avoid negative consequences in the film industry and wider society. One of the primary ethical concerns is the potential impact of AI on job losses in the film industry. As AI is integrated more deeply into the film-making process, some jobs that were previously done by humans may be made redundant. This could have a significant impact on the workforce and the wider economy. It is important to consider the potential impacts and steps that can be taken to support workers through such transitions. Another important ethical challenge is bias in Al systems. Al relies heavily on the data it is trained on, and if the data is biased, the Al will learn and perpetuate that bias. For example, AI used in casting could perpetuate gender or racial stereotypes, leading to a lack of diversity in film roles. It is important to ensure that AI systems are trained on diverse, unbiased data, and that the output is continually monitored to detect and mitigate any potential biases. Data privacy is also a significant concern when using AI in cinema. For example, facial recognition technology can raise privacy concerns, due to the possibility of misidentification or misuse of personal data. There are also broader concerns about the potential use of AI for unauthorized surveillance. It is essential to ensure that the use of AI in cinema complies with data privacy regulations and to put in place measures to protect people's privacy. Finally, it is important to address practical challenges such as limitations in the current AI technology, technology infrastructure, and the cost of implementing AI in film-making. AI technology is in its early stages and still has some limitations, such as restricted creativity, which means it's crucial only to use AI in film-making that can be effectively produced through AI. Establishing a strong technology infrastructure that ensures the smooth functioning of AI is also essential. Additionally, the cost of implementing AI in film-making can be a significant barrier, so it is crucial to assess carefully the cost-benefit proposition before adopting AI in the film industry. It is essential to consider the ethical and practical challenges of using AI in cinema, including job losses, biases, and data privacy concerns. By addressing these challenges, we can use AI technologies in a way that enhances the film-making process while also ensuring that it serves the wider public good. (p.26-27)
- 4. The blending of human and AI creativity can blur the lines between genuine human-authored content and AI-generated material. Ethical guidelines should be established to clearly distinguish between the two, maintaining trust and transparency with the audience. (p.141)
- 5. The journey of 'Faking the Real' started in 1857 when Oscar Rejlander created the world's first 'special effects' image by combining different sections of 32 negatives into a single image, making a montaged combination print and has continued with Puppetry, Robotics, Prosthetics, CGI, and now Al-generated 'Imagery'. (p.167)
- The CGI, 3D computer animation, or computer synthetic images are the technology which enables a film maker to create the Virtual World in more realistic way whether it is pure fantasy, re-creating the past or replacing a Real actor with Digital Avatar. (p.168)

- 7. The 'Computer Generated Imagery' defines itself that those all imagery which has been created by using Computer Program or software known as CGI and if someone uses this technology to create or add digitally any visual to Live Action Footage called as Visual effects. (p.168)
- The development of powerful artificial intelligence (deepfakes) has made it possible for filmmakers to clone actors, living or dead, to any degree, including immortalization or de-aging. (p.169)
- 9. Deepfakes have generated serious ethical questions despite having entertainment uses, like as special effects in video games and movies. The simplicity with which deepfake technology may <u>be used by anybody to produce incredibly realistic but deceptive content raises concerns about</u> <u>permission, privacy, and the possible dissemination of false information.</u> As a result, approaches for identifying and lessening the detrimental effects of deepfakes are still being discussed and researched. (p.172)

Sun, P., 2024. A Study of Artificial Intelligence in the Production of Film. In SHS Web of Conferences (Vol. 183, p. 03004). EDP Sciences.

- The application of AI in films is studied in this article, and according to analysis, it can be concluded that in the process of film production, AI technology has its advantages in increasing efficiency and cost-effectiveness in film production. It can also enhance the overall quality of films, impressing the audience by generating special effects and providing filmmakers with new tools and techniques to explore and experiment with. (p.1)
- 2. The term " digital special effects", or simple "digital effects", refers to the use of computer graphics image technology to create virtual video effects of film editing technology, including the creation of the early film composition, character design, and middle of the virtual scene atmosphere rendering and post-processing. (p.3)
- 3. After the computer is involved in the field of film special effects, the post-production ability of film special effects is greatly enhanced, and the content of digital film special effects is more extensive and in-depth. (p.3)
- 4. The application of AI to the film industry may result in the destruction of originality. AI lacks creativity and emotion, despite the fact that it can learn from massive volumes of data. (p.3)
- 5. Rather than being a deciding factor in filmmaking, AI should be used as a tool. Teams working on film production can use artificial intelligence to assist with tasks like picture analysis and large data analysis, but the creative process still has to involve creativity and emotion. Instead of just depending on AI-generated material, creators should keep their own distinctive viewpoints and inventiveness. (p.3)
- Artificial intelligence can speed up the production of realistic visual effects, but it cannot have a fully developed sense of narrative or emotion. When artificial intelligence is overused to create special effects, it may leave the viewer feeling cold and impersonal. (p.3)

Deepfake

Gaur, L (ed.) 2022, DeepFakes:Creation, Detection, and Impact, Taylor & Francis Group, Milton. Available from: ProQuest Ebook Central. [16 June 2024].

- The current era can be explicitly characterized by digital dominance, where the creation, communication, and dissemination of information are digitally driven. It has raised an alarming and challenging condition of trust and verification of the digital content available for the citizens. Al is a paradigm-shift technology due to its diverse utilitarian functions exhibited in the past years. (p.1)
- 2. The risk and the societal implications are substantial and far- damaging, notably with the minimal technical proficiency and devices needed to produce DFs. (p.2)
- 3. DeepFake is a collection of 'deep learning' and 'forgery,' which employs DL algorithms to modify images, acoustic, and video to generate a synthetic/phony media. (p.2)
- 4. The underlying technology can overlay face images, create facial motions, switch faces, maneuver facial expressions, produce faces, and synthesize the speech of a target individual onto a video of a spokesperson to create a video of the target individual acting similarly to the source person. (p.2)
- 5. Seeing is believing: It is pretty convincing for us to believe in what we see and listen to from our ears. It is unlikely not to believe in the things you have observed yourself. (p.4)
- 6. With easy-to-use new apps, it is much easier to create such deceiving content in image, video, or any other form of media. (p.4)
- Political DeepFakes are at the prominent edge of video-based misinformation available online. (p.5)
- 8. The movie industry uses this technology for special effects and animations that seem harmless. However, this technology is now being used for nefarious purposes by tech-savvy criminals. DF technology appears to have introduced a new class of media that malicious users are using to their advantage. DFs can threaten political elections, cybersecurity, individual and corporate finances, reputations, and much more. (p.102)
- 9. Fake videos might accidentally or maliciously end up archiving historically considered trustworthy, such as those of media news. (p.104-105)
- 10. DFs are quick to create and easy to circulate to a broad audience and hence can deliberately or unknowingly be used to misinform the public for political advantage. Because it is harder for an ordinary person to differentiate between a real and a DF video, these fakes can alter the very sense of the reality of the video. (p.105)
- The potential for nefarious use of DF technology to perpetrate damage and inflict harm to society, the election system, individuals, and institutions has raised alarms to seek effective countermeasures to combat them. (p.108)
- 12. Currently, most countries are not legally prepared to deal with DFs. There is no law or civil liability regime in most nations against the creation or distribution of DFs. (p.108)

- 13. Singapore recently passed legislation that empowers the government to order social media platforms to remove any content that it considers to be false. (p.108)
- 14. Video Authenticator Tool: Launched by Microsoft in 2020, it detects the amalgamation boundary of the DF and understated grayscale elements and even provides a confidence score of the manipulation. (p.109)
- 15. Biological Signals: A tool developed by the researchers from Binghamton University and Intel looks for unique natural and generative noise signals left by DF model videos and can obtain around 97.29% accuracy for fake video detection. (p.109)
- Media authentication: It is one such tool that can authenticate the origin and content of the media creator. This authentication could be achieved using a watermarking chain of custody logging or other available means. (p.109)
- 17. Media provenance: Adding provenance information and attaching it to the media helps make trustworthy content easier to identify. (p.109)
- Enhancing media literacy: Media literacy is yet another effective tool to combat disinformation caused by DFs. Improving media literacy to cultivate a discerning public is one of the precursors to combat the challenges posed by DFs. (p.110)

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.

- 1. Deepfake technology, once associated with controversial uses, has found a legitimate and innovative application within the filmmaking industry. (p.1)
- 2. By harnessing deep learning algorithms, filmmakers can create hyper-realistic digital assets, seamlessly blending fiction with reality. (p.1)
- 3. The distinction between fact and fiction may be blurred with the use of deepfake technology, which is based on advanced deep learning algorithms and produces digital assets that are incredibly lifelike. (p.1)
- 4. Concerns about permission, authenticity, and potential abuse must be considered as we explore the creative possibilities this technology offers. (p.1)
- 5. Deepfake technology enables seamless facial replacement, allowing filmmakers to superimpose one actor's face onto another's body. (p.4)
- 6. Deepfake technology can be used to de-age or age actors digitally, allowing them to portray characters at different stages of their lives. (p.4)
- 7. Deepfake technology enables the recreation of deceased actors or characters, allowing filmmakers to digitally resurrect them for new projects or scenes. (p.4)
- 8. Deepfake algorithms excel in achieving lifelike facial replacement, de-aging effects, and character recreation, providing filmmakers with newfound flexibility and creative freedom. While

the technology streamlines production workflows and optimizes resource allocation, ethical and legal considerations regarding consent, privacy, and potential misuse remain paramount. (p.5)

Westerlund, M., 2019. The emergence of deepfake technology: A review. *Technology* innovation management review, 9(11).

- 1. Deepfakes are the product of artificial intelligence (AI) applications that merge, combine, replace, and superimpose images and video clips to create fake videos that appear authentic. (p.39)
- Deepfake technology can generate, for example, a humorous, pornographic, or political video of a person saying anything, without the consent of the person whose image and voice is involved. (p.39)
- 3. The game-changing factor of deepfakes is the scope, scale, and sophistication of the technology involved, as almost anyone with a computer can fabricate fake videos that are practically indistinguishable from authentic media. (p.39)
- 4. The film industry can benefit from deepfake technology in multiple ways... Movie makers will be able to recreate classic scenes in movies, create new movies starring long-dead actors, make use of special effects and advanced face editing in post-production, and improve amateur videos to professional quality. (p.41)
- 5. Deepfakes raise concerns about privacy and copyright, as the visual depictions of people on deepfake videos are not exact copies of any existing material, but rather new representations generated by AI. (p.44)

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.

- <u>A key ethical issue facing the producer is the rights of the actor who performs to camera.</u> <u>Following the filming of the actor's performance, their face is replaced by the deepfake</u> <u>technologist, raising major questions: what remains of the original performance? What are the</u> <u>moral and legal rights of that performer? (p.121)</u>
- 2. The reality is that filmmakers who decide to incorporate deepfakes into their work are operating in an environment of legal uncertainty, with a lack of clarity as to the responsibilities and obligations on those involved in creating synthetic media. (p.121)

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.

- 1. <u>Deepfakes, synthetic media created using artificial intelligence and machine learning techniques,</u> <u>allow for the creation of highly realistic fake videos and audio recordings. (p.58)</u>
- Deepfakes refer to hyperrealistic media that is synthetically generated by artificial intelligence. The term deepfake originated in 2017 from a Reddit user named "deepfakes" who pioneered the use of deep learning to swap celebrity faces onto pornographic videos. However, the techniques

used in deepfakes build upon a long evolution of media and technology. From the early days of Photoshop to cutting-edge generative adversarial networks (GANs), the ability to manipulate images and video has grown exponentially. As deepfake technology proliferates, the threats posed by disinformation and media manipulation have become a defining challenge of the digital age. (p.58-59)

- 3. <u>Deepfake algorithms examine source media to learnpeech patterns, facial expressions, skin</u> <u>textures, mouth movements, and more. They can then transpose the face or voice of an existing</u> <u>person onto target media, combining realistic personal attributes and movements. (p.59)</u>
- <u>A major challenge posed by deepfakes is eroding public trust in media authenticity. As</u> synthesized videos and audio become indistinguishable from reality, people may dismiss all media as fake. (p.59)
- 5. Methods like digital watermarking, blockchain verification, and subtle artifact detection may help identify manipulated media. Social media platforms are also grappling with deepfake moderation policies. (p.59)
- Casual observers lack knowledge of typical deepfake limitations that create detectable artifacts. Through tutorials, courses, and awareness campaigns, both expert and lay audiences can learn which visual cues to look for when assessing media authenticity (p.67).