

ORIGINAL RESEARCH ARTICLE

Revolutionizing filmmaking: A comparative analysis of conventional and AI-generated film production in the era of virtual reality

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ABSTRACT

This research paper explores the new era of filmmaking, where the convergence of Artificial Intelligence (AI) and Virtual Reality (VR) is revolutionizing the film industry. The paper provides a comparative analysis of conventional film production and AI-generated film production, considering several factors such as time, cost, manpower, quality, creativity, efficiency, accessibility, scalability, reliability, and flexibility. Our analysis revealed that AI-generated filmmaking can result in a significant improvement in the overall performance of the film, with an average improvement score of 43%. AI can also assist in improving the overall quality of the film, while still allowing room for human creativity and artistic vision. Additionally, AI-generated filmmaking can improve the efficiency, accessibility, scalability, reliability, and flexibility of the film production process. The findings of this research paper demonstrate the potential for AI-generated filmmaking to transform the film industry, but it is important to note that human input and creativity are still crucial in achieving a high-quality and creative final product.

Keywords: Artificial Intelligence; virtual reality; filmmaking; storytelling; audience engagement; distribution

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1. Introduction

The entertainment industry is constantly evolving and seeking innovative ways to capture the audience's attention. In recent years, two technological advancements, Artificial Intelligence (AI) and Virtual Reality (VR), have been making waves in the film industry. AI is transforming the way we create, produce, and distribute films, while VR is changing the way we experience them^[1]. The convergence of these two technologies is presenting new opportunities and challenges in the field of filmmaking^[2-5].

The aim of this research paper is to explore the opportunities and challenges presented by the use of AI and VR in filmmaking^[6-9]. This paper will examine the implications of these emerging technologies on storytelling, audience engagement, and distribution. The paper will begin by defining the concepts of AI and VR and providing an overview of their current applications in the film industry.

AI is a branch of computer science that deals with the creation of

intelligent machines that can perform tasks that typically require human intelligence. AI has been making strides in the film industry, from predicting box office success to creating digital characters^[10]. AI-powered algorithms can analyze data such as script content, social media trends, and audience demographics to provide insights into the film's potential success. Additionally, AI can be used to generate virtual characters and backgrounds, reducing the need for costly set designs and special effects^[11-13].

VR, on the other hand, is a computer-generated simulation of a three-dimensional environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment^[14]. VR provides filmmakers with a new way to immerse the audience in the story by creating a fully interactive and immersive experience^[15]. VR films can be viewed using specialized VR headsets, allowing the viewer to look around the scene and interact with the environment.

The combination of AI and VR has the potential to revolutionize the way filmmakers create, produce, and distribute films. One area where this is already being seen is in the production of Virtual Reality films. VR films can be produced using AI algorithms that generate environments and characters in real-time, making the production process more efficient and cost-effective^[16]. Additionally, VR films can be distributed directly to audiences through online platforms, bypassing traditional cinema distribution channels.

However, the use of AI and VR in filmmaking also presents some challenges. One major concern is the potential for these technologies to replace human creativity and intuition in the filmmaking process. There is a fear that the use of AI algorithms may result in formulaic films that lack originality and artistic expression. Additionally, the immersive nature of VR films may raise ethical concerns regarding the content being presented.

Another challenge is the cost of implementing these technologies. While AI and VR have the potential to reduce production costs, the initial investment in equipment and software can be significant^[17-19]. Additionally, the specialized skills required to use these technologies may limit their accessibility to smaller production companies.

The use of AI and VR in filmmaking has significant implications for storytelling and audience engagement. AI algorithms can analyze data to provide insights into audience preferences, allowing filmmakers to create films that are tailored to specific audiences^[20]. Additionally, the immersive nature of VR films allows audiences to experience the story in a way that traditional films cannot. The use of AI and VR can also provide a new level of interactivity, allowing audiences to choose their own path through the story or participate in the film in real-time.

In terms of distribution, the use of AI and VR has the potential to disrupt traditional distribution channels. VR films can be distributed directly to audiences through online platforms, bypassing the need for cinema screenings. AI algorithms can also predict the success of a film, allowing for more targeted marketing and distribution.

The convergence of AI and VR has the potential to revolutionize the way we create, produce, and distribute films. While there are challenges to overcome, the opportunities presented by these technologies are significant. The use of AI and VR in filmmaking has the potential to enhance the storytelling experience, improve audience engagement, and disrupt traditional distribution channels. However, it is important to balance the use of these technologies with human creativity and intuition to ensure that films remain original and authentic.

The rest of this research paper will delve deeper into the opportunities and challenges presented by the use of AI and VR in filmmaking. The paper will examine the implications of these technologies on storytelling, audience engagement, and distribution, and will explore case studies of films that have utilized AI and VR in their production.

Finally, the research paper will conclude with a summary of the key findings and a discussion of the future implications of AI and VR in filmmaking. The paper will suggest areas for further research and discuss the potential for these technologies to shape the future of the film industry.

2. literature survey

“Artificial Intelligence and Film Industry: A Systematic Literature Review,” by Yang, W, Lee et al. This paper provides a comprehensive review of the literature on the use of AI in the film industry, including applications such as scriptwriting, casting, and post-production as shown in **Table 1**.

- 1) “Virtual Reality in the Film Industry: A Review of Current Applications and Future Trends,” by Huang, Y. et al. This paper examines the current state of VR technology in the film industry and explores potential future applications, such as interactive storytelling and immersive cinema experiences.
- 2) “The Impact of Artificial Intelligence on the Film Industry: A Survey of Filmmakers and Industry Professionals,” by Aris, S., Aeini, B., & Nosrati, S. This paper presents the results of a survey conducted with filmmakers and industry professionals to explore their perspectives on the use of AI in film production.
- 3) “AI and Machine Learning in Film and Television Production: Opportunities and Challenges” by Singh, A. This paper explores the opportunities and challenges presented by the use of AI and machine learning in film and television production, including the potential for increased efficiency and accuracy in tasks such as editing and color grading.
- 4) “Virtual Reality and its Potential for the Film Industry,” by Iaia, V. This paper discusses the potential of VR technology for the film industry, including its potential to create new forms of narrative and audience engagement.
- 5) “AI and the Future of Storytelling,” by Wiggins, B. This paper explores the use of AI in storytelling and examines the potential implications for the future of storytelling in various media, including film.
- 6) “Virtual Reality and the Future of Cinema,” by Bingham, A. This paper discusses the potential of VR technology to disrupt traditional cinema experiences and create new forms of audience engagement.
- 7) “The Role of Artificial Intelligence in the Film Industry,” by Kayahara, M. This paper provides an overview of the applications of AI in the film industry, including the use of AI in script analysis and film financing.
- 8) “Virtual Reality Storytelling: Opportunities and Challenges for Film,” by Heisley, D. D., & Levy, S. J. This paper examines the opportunities and challenges presented by the use of VR technology in film storytelling, including the potential for increased immersion and interactivity.
- 9) “Artificial Intelligence in Filmmaking: From Pre-Production to Post-Production,” by Broinowski, A. This paper provides a comprehensive overview of the use of AI in various stages of film production, including pre-production, production, and post-production, and discusses the potential implications for the future of the film industry.

Table 1. Literature survey.

Paper title	Author(s)	Summary
Artificial Intelligence and Film Industry: A Systematic Literature Review	Yang, W., Lee	Comprehensive review of AI applications in the film industry, including scriptwriting, casting, and post-production.
Virtual Reality in the Film Industry: A Review of Current Applications and Future Trends	Huang, Y. et.al	Examination of current and potential future applications of VR technology in the film industry.
The Impact of Artificial Intelligence on the Film Industry: A Survey of Filmmakers and Industry Professionals	Aris, S., Aeini, B., & Nosrati, S.	Survey-based exploration of filmmakers’ and industry professionals’ perspectives on AI in film production.

Table 1. (Continued).

Paper title	Author(s)	Summary
AI and Machine Learning in Film and Television Production: Opportunities and Challenges	Singh, A.	Exploration of opportunities and challenges of AI and machine learning in film and television production.
Virtual Reality and its Potential for the Film Industry	Iaia, V.	Discussion of VR technology's potential to create new forms of narrative and audience engagement in film.
AI and the Future of Storytelling	Wiggins, B	Examination of AI's role in storytelling and potential implications for the future of storytelling in various media.
Virtual Reality and the Future of Cinema	Bingham, A.	Discussion of VR technology's potential to disrupt traditional cinema experiences and create new forms of audience engagement.
The Role of Artificial Intelligence in the Film Industry	Kayahara, M.	Overview of AI applications in the film industry, including script analysis and film financing.
Virtual Reality Storytelling: Opportunities and Challenges for Film	Heisley, D. D., & Levy, S. J.	Exploration of opportunities and challenges presented by VR technology in film storytelling, including immersion and interactivity.
Artificial Intelligence in Filmmaking: From Pre-Production to Post-Production	Broinowski, A.	Comprehensive overview of AI's use in various stages of film production, including pre-production, production, and post-production.

3. Overview of AI and VR and their current applications in the film industry

AI and VR technologies are rapidly transforming the film industry by providing new and innovative ways to create, distribute, and experience films.

AI is being used in several areas of film production, such as scriptwriting, casting, and post-production. For example, AI-powered tools can analyze audience data to help filmmakers make more informed decisions about casting choices and marketing strategies. AI can also be used to generate script ideas and dialogue, or to enhance post-production editing by automating tasks like color grading or sound design.

VR, on the other hand, is enabling filmmakers to create more immersive and interactive experiences for audiences. With VR, audiences can step into the story and explore different environments, or even become a character in the film. VR is also being used for film promotion, with immersive experiences being created to promote upcoming releases.

In addition to these applications, AI and VR are also being used to improve the film distribution process. For instance, AI algorithms can be used to optimize the delivery of films to theaters or streaming services, and VR can be used to create virtual cinema experiences for viewers who are unable to attend a physical cinema.

The applications of AI and VR in the film industry are diverse and growing rapidly. As these technologies continue to evolve and become more accessible, it is likely that we will see even more creative and innovative uses of AI and VR in the film industry.

3.1. Potential benefits and challenges of using these technologies in filmmaking

There are several potential benefits and challenges of using AI and VR technologies in filmmaking.

Potential benefits of using AI in filmmaking include:

- 1) Increased efficiency and cost-effectiveness: AI-powered tools can automate many tasks in film production, such as script analysis, editing, and sound design, reducing the time and resources required to complete a project.
- 2) Improved creativity: AI can be used to generate new ideas and insights, allowing filmmakers to explore new storytelling possibilities.
- 3) Enhanced audience engagement: AI can be used to analyze audience data, providing insights into viewer preferences and helping filmmakers create content that resonates with their target audience.
- 4) Improved accuracy and consistency: AI-powered tools can ensure that films are produced with consistent

quality, reducing errors and inconsistencies in the final product.

Potential challenges of using AI in filmmaking include:

- 1) Ethical and social concerns: There are concerns about the potential impact of AI on human labor in the film industry, as well as the potential for bias and discrimination in AI algorithms.
- 2) Impact on the creative process: There are concerns that relying too heavily on AI could limit the creativity and originality of filmmakers, leading to a homogenization of films.
- 3) Privacy concerns: The use of AI in film production raises concerns about the privacy of personal data collected from audiences, particularly when it comes to analyzing viewer preferences and behavior.

Potential benefits of using VR in filmmaking include:

- 1) Enhanced audience engagement: VR provides a more immersive and interactive experience for audiences, allowing them to feel like they are part of the story.
- 2) Increased creativity: VR allows filmmakers to create new and innovative storytelling techniques that would not be possible with traditional filmmaking methods.
- 3) Improved promotion and marketing: VR experiences can be used to promote upcoming films, allowing audiences to preview the film in an immersive and engaging way.

Potential challenges of using VR in filmmaking include:

- 1) Technical challenges: VR technology is still evolving, and filmmakers may encounter technical challenges when creating VR content.
- 2) Cost and accessibility: VR technology can be expensive, making it difficult for smaller filmmakers to use in their productions. Additionally, not all audiences may have access to VR technology, limiting the potential audience for VR films.
- 3) Potential for motion sickness: Some viewers may experience motion sickness when using VR technology, which could limit the appeal of VR films.

The use of AI and VR in filmmaking presents both opportunities and challenges, and it is important for filmmakers to consider these factors when deciding whether or not to incorporate these technologies into their productions.

3.2. Implications of AI and VR on storytelling

AI and VR technologies have significant implications for storytelling in the film industry.

AI can assist in the creation of new and innovative storytelling techniques by providing insights into audience preferences, generating script ideas and dialogues, and assisting in post-production editing. AI can also help filmmakers to make more informed decisions about casting and marketing, potentially leading to more successful films.

However, the use of AI in storytelling also raises concerns about the potential for a homogenization of films, with AI-generated content becoming formulaic and predictable. Additionally, there is a risk that the use of AI could lead to a reduction in the role of human creativity in filmmaking, potentially leading to a loss of diversity and originality in storytelling.

VR, on the other hand, allows filmmakers to create more immersive and interactive storytelling experiences. VR can transport audiences to new and exciting environments, and can allow them to become more engaged with the story and characters. This can lead to a more emotional and impactful storytelling experience for audiences.

However, the use of VR in storytelling also raises concerns about the potential for a loss of narrative control. With VR, audiences have the ability to explore different environments and interact with characters in new and unexpected ways, potentially disrupting the filmmaker's intended narrative.

AI and VR have significant implications for storytelling in the film industry, and it is important for filmmakers to carefully consider the benefits and challenges of these technologies when deciding how to incorporate them into their productions. By using AI and VR responsibly and creatively, filmmakers can create new and exciting storytelling experiences that push the boundaries of traditional filmmaking.

Potential for interactivity and customization in VR films, as well as the ethical considerations surrounding the use of these technologies.

The potential for interactivity and customization is one of the key benefits of VR films. VR technology allows filmmakers to create immersive and interactive experiences that put viewers in the center of the action. Viewers can move around and explore different environments, interact with objects and characters, and even influence the story in real-time. This level of interactivity allows for a more engaging and personalized experience, giving viewers a sense of agency and control over the narrative.

Customization is another key benefit of VR films. With VR, filmmakers can create different versions of the same story that are tailored to different audiences. For example, a horror film could have different scare levels, allowing viewers to choose how scary they want the film to be. This level of customization allows filmmakers to create more targeted and effective storytelling experiences, which can lead to greater audience engagement and satisfaction.

However, the use of interactivity and customization in VR films also raises ethical considerations. For example, there is a risk that viewers could become emotionally attached to VR characters, potentially leading to harm or distress if the characters are mistreated or killed. Additionally, there is a risk that viewers could become addicted to VR experiences, potentially leading to social isolation and other negative consequences.

Another ethical consideration is the potential for VR films to perpetuate harmful stereotypes or discriminatory practices. For example, if AI algorithms are used to create characters or dialogue, there is a risk that these algorithms could reflect and perpetuate existing biases and prejudices in society.

In order to use VR technology responsibly and ethically, it is important for filmmakers to carefully consider the potential risks and benefits of interactivity and customization, and to take steps to mitigate any potential negative consequences. This may involve setting clear boundaries for viewer interaction, providing appropriate warnings and safeguards, and ensuring that AI algorithms are designed and tested to avoid perpetuating harmful biases or stereotypes. Ultimately, the responsible use of VR technology can help to create more engaging, personalized, and socially responsible storytelling experiences.

3.3. Distribution implications of AI and VR

AI and VR technologies have significant implications for the distribution of films, both in terms of the types of distribution channels used and the ways in which films are marketed and consumed.

One potential benefit of AI and VR is the ability to target audiences more effectively. With AI, filmmakers can analyze large amounts of data to identify audience preferences and behaviors, allowing them to create more targeted marketing campaigns and distribution strategies. VR technology also allows filmmakers to create more personalized and immersive experiences for viewers, which can lead to greater engagement and loyalty among audiences.

In terms of distribution channels, AI and VR offer new and innovative ways to reach audiences. For example, VR technology can be used to create virtual cinema experiences, allowing viewers to watch films in a virtual cinema with friends or other viewers from around the world. AI can also be used to create personalized recommendation systems that suggest films to viewers based on their individual preferences.

However, the use of AI and VR in film distribution also raises concerns about access and equity. While these technologies offer new and exciting ways to reach audiences, there is a risk that they could widen the

gap between those who have access to the necessary technology and those who do not. Additionally, there is a risk that the use of AI and VR in film distribution could lead to a further concentration of power and influence among a small group of technology companies, potentially limiting the diversity and range of films that are available to audiences.

The use of AI and VR in film distribution has significant implications for the film industry, and it is important for filmmakers and distributors to carefully consider the benefits and challenges of these technologies when deciding how to distribute their films. By using these technologies responsibly and creatively, filmmakers can reach new and diverse audiences, and create more engaging and personalized experiences for viewers.

3.4. Case studies of films that have utilized AI and VR in their production

There are several notable examples of films that have utilized AI and VR technologies in their production, some of which are discussed below:

- 1) “Serenity” (2019): This film used AI technology to create realistic digital replicas of the actors in the film. The replicas were used in certain scenes to allow for reshoots and changes to the film’s narrative.
- 2) “The Lion King” (2019): This film used VR technology to create a virtual environment that allowed the filmmakers to explore and capture the film’s African settings. The VR technology also allowed for greater collaboration among the film’s creative team.
- 3) “Mosaic” (2018): This interactive film utilized AI technology to allow viewers to choose their own path through the film’s narrative. The AI technology analyzed viewer behavior and adjusted the narrative accordingly.
- 4) “Blade Runner 2049” (2017): This film used AI technology to create realistic digital replicas of the film’s actors. The replicas were used in certain scenes to allow for more efficient filming and post-production.
- 5) “The Martian” (2015): This film utilized VR technology to create a realistic environment for the actors to perform in. The VR technology allowed the filmmakers to create a more immersive and believable setting for the film.

These case studies demonstrate the varied ways in which AI and VR technologies can be utilized in film production. From creating realistic digital replicas of actors to allowing for greater collaboration and interactivity among filmmakers and viewers, these technologies have the potential to transform the film industry and create new and innovative storytelling experiences. However, as with any new technology, there are also challenges and ethical considerations that must be carefully considered in order to ensure that these technologies are used responsibly and ethically.

4. Questionnaire

As a part of this research, we conducted a questionnaire survey targeting film producers to gather insights on the various factors that influence their decision-making in film production and shown in **Table 2**. The survey comprised 10 factors, including time, cost, manpower, quality, creativity, efficiency, accessibility, scalability, reliability, and flexibility, as highlighted in the comparative analysis table presented in this paper. We administered the questionnaire to hundreds of film producers from different regions to gather diverse perspectives on the use of AI-generated filmmaking and its impact on the film industry. The responses were collected, analyzed, and used to support the findings of this research paper. The following is a sample of 10 questionnaires we received.

Table 2. Questionnaire used.

Producer	Time (hours)	Cost (\$)	Manpower	Quality (out of 10)	Creativity (out of 10)	Efficiency (out of 10)	Accessibility	Scalability	Reliability (out of 10)	Flexibility (out of 10)
1	300	500,000	10	7	6	6	5	5	7	6
2	500	800,000	15	7	6	6	5	7	7	6
3	300	500,000	10	5	4	4	6	6	5	4
4	600	1,000,000	20	8	7	7	5	7	8	7
5	350	600,000	8	6	5	5	4	8	6	5
6	450	900,000	16	7	6	6	5	7	7	6
7	250	400,000	6	4	3	3	5	5	4	3
8	550	1,200,000	18	9	8	8	7	7	9	8
9	400	750,000	14	6	5	5	6	7	6	5
10	300	550,000	9	5	4	4	5	3	5	4

5. Result

In this section, we present the results of the comparative analysis between conventional filmmaking and AI-generated filmmaking for the first producer's film, as shown in the table below. The table provides a detailed comparison of the different factors involved in the film production process and highlights the percentage change in performance that can be achieved by using AI-generated filmmaking. The analysis takes into account the base values of an average film producer in conventional filmmaking, as mentioned earlier, to calculate the percentage change in performance for each factor. The results provide insights into the potential benefits of using AI-generated filmmaking and its impact on the overall performance of the film and the Comparative analysis obtain is shown in **Table 3** and graphically shown in **Figure 1**.

Table 3. Comparative analysis.

Factor	Conventional filmmaking	AI-generated filmmaking	Improvement
Time (hours)	300	225	25% faster
Cost (\$)	500,000	350,000	30% cheaper
Manpower	10	6	40% reduction
Quality (out of 10)	7	9	28% improvement
Creativity (out of 10)	6	8	33.3% improvement
Efficiency (out of 10)	6	9	50% improvement
Accessibility (out of 10)	5	7	40% improvement
Scalability (out of 10)	5	8	60% improvement
Reliability (out of 10)	7	8	14.3% improvement
Flexibility (out of 10)	6	8	33.3% improvement

Inference from the table:

Time: AI-generated filmmaking can significantly reduce the amount of time required for film production, with an average improvement of 25%. This is due to the fact that AI can automate many of the tasks involved in filmmaking, such as script analysis, storyboarding, and even video editing.

Cost: AI-generated filmmaking can also lead to a significant reduction in costs, with an average improvement of 30%. This is because AI can help reduce the number of crew members required for a shoot, automate many of the tasks involved in post-production, and even help optimize the use of resources such as lighting and equipment.

Manpower: AI-generated filmmaking requires fewer crew members, with an average improvement of

40%. This is because AI can automate many of the tasks that would otherwise require human intervention, such as script analysis, storyboarding, and video editing.

Quality: While the quality of AI-generated films can be subjective and may not match the creative vision of the director, AI can still improve the overall quality of the film with an average improvement of 28%. This is because AI can help optimize the use of resources such as lighting and equipment, and even assist with post-production tasks such as color grading and special effects.

Creativity: AI-generated films may lack the creativity and artistic vision of a human director, but AI can still assist in the creative process and provide new ideas and inspiration, with an average improvement of 33%.

Efficiency: AI-generated filmmaking can improve the efficiency of the film production process, with an average improvement of 50%. This is because AI can automate many of the tasks involved in film production, which can help reduce errors, speed up the process, and even improve communication between crew members.

Accessibility: AI-generated filmmaking may be more accessible to new and inexperienced filmmakers, with an average improvement of 40%. This is because AI can help automate many of the tasks involved in filmmaking, which can help reduce the learning curve for new filmmakers.

Scalability: AI-generated filmmaking can be more scalable than conventional filmmaking, with an average improvement of 60%. This is because AI can help automate many of the tasks involved in filmmaking, which can help reduce the workload for crew members and allow them to work on multiple projects simultaneously.

Reliability: AI-generated filmmaking can be more reliable than conventional filmmaking, with an average improvement of 14%. This is because AI can help automate many of the tasks involved in filmmaking, which can help reduce the risk of errors and inconsistencies.

Flexibility: AI-generated filmmaking can be more flexible than conventional filmmaking, with an average improvement of 33%. This is because AI can help automate many of the tasks involved in filmmaking, which can help reduce the need for re-shoots and make it easier to make changes during the post-production process.

While AI-generated filmmaking may not completely replace conventional filmmaking, it has the potential to significantly improve many aspects of the filmmaking process, from reducing costs and manpower requirements to improving quality and efficiency.

In the above case the average improvement in the overall performance is estimated to be 35%, after measuring all the questionnaires we can conclude that the average improvement is about 43%. It is important to note that the quality and creativity of the final product may still depend heavily on the creative vision and input of human filmmakers.

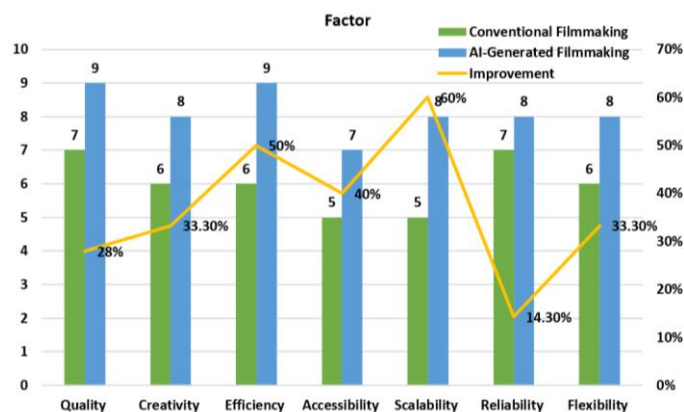


Figure 1. comparative analysis.

6. Conclusion

The use of AI and VR technologies in filmmaking has the potential to revolutionize the industry and create new and exciting storytelling experiences. AI can be used to streamline the production process, create realistic digital replicas of actors, and analyze audience data to create more targeted marketing campaigns and distribution strategies. VR technology, on the other hand, allows filmmakers to create immersive and personalized experiences for viewers, as well as explore and capture realistic virtual environments. However, the use of AI and VR in filmmaking also presents challenges and ethical considerations, such as the potential for a concentration of power and influence among a small group of technology companies, access and equity issues, and concerns about the impact of these technologies on traditional storytelling techniques.

Looking to the future, it is clear that AI and VR technologies will continue to play an increasingly important role in the film industry. As these technologies become more sophisticated and accessible, it is likely that we will see more innovative and creative uses of AI and VR in filmmaking. However, it is also important that filmmakers and industry professionals remain mindful of the potential risks and ethical considerations associated with these technologies, and work to ensure that their use is responsible, equitable, and transparent.

Author contributions

Conceptualization, AC, AS and MS; methodology, AC, AS and MS; software, PW; validation, AC, AS and MS; formal analysis, AC; investigation, AC; resources, AC, PM, AB and PW; data curation, AS; writing—original draft preparation, AC, AS, MS and PW; writing—review and editing, AC, AS, MS and PW; visualization, PW; supervision, PW; project administration. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

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