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Kostas Karpouzis *

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Where No Filmmaker Has Gone Before: The Impact of Artificial Intelligence on the Film Industry

Kostas Karpouzis

Department of Communication, Media and Culture, Panteion University of Social and Political Sciences

Abstract: This paper discusses the transformative role Artificial Intelligence (AI) is anticipated to play in the film industry, specifically concerning its capacity to enhance and redefine the parameters of cinematic realism. As the integration of AI in the cinematic field gains momentum, an exploration of its implications on the perceived realism in film is essential. The paper first outlines the historical trajectory of realism in cinema, mapping its evolution and its core principles with respect to technological advances; we then introduce AI as a disruptive technology poised to reshape this trajectory. The focus of the paper lies in examining how AI, through its advanced image recognition and synthesis, data analysis, and deep learning capabilities, has the potential to revolutionise traditional methods of film production, post-production, and distribution, significantly impacting the authenticity of cinematic narratives. The paper then discusses potential drawbacks, such as the risk of over-reliance on technology and the ethical implications of AI utilisation, offering a balanced perspective on this emergent phenomenon. The paper aims to inform film scholars, industry professionals, and enthusiasts about the profound transformations AI is set to bring, propelling the discussion towards the future of film in the era of artificial intelligence.

Keywords: Artificial Intelligence (AI); Cinematic Realism; Film Industry; Procedural Narrative; CGI (Computer-Generated Imagery)

Introduction

The emergence of easy-to-use tools and services utilising Artificial Intelligence (AI) algorithms has brought about drastic changes in various industries, and the film industry is no exception. As AI technologies continue to evolve and integrate into the creative and production processes, they are challenging traditional notions of realism, creativity, authenticity, and representation, as well as technical aspects, such as distribution and content recommendation. This chapter explores the profound impact of AI on the film industry, delving into the potential disruptions it presents, the ethical implications it raises, and the complex cultural and gender dynamics it brings to the fore.

The integration of AI in filmmaking has opened up a wide range of possibilities, enabling filmmakers to push the boundaries of what is achievable on screen; from advanced CGI techniques that blur the line between reality and fantasy to automated scripting tools that generate compelling narratives, AI is transforming the way films are conceptualised, produced, and experienced by audiences. However, this transformative potential also comes with its own challenges that demand close examination. One of the most significant disruptions AI poses to the film industry is its potential to democratise the filmmaking process: with AI-powered tools becoming more accessible and user-friendly, aspiring filmmakers, and independent creators now have the means to create high-quality content without the need for extensive resources, talent, or technical expertise. This democratisation has the ability to diversify the voices and perspectives represented on screen, challenging the hegemony of dominant cultures and industries that have long shaped the cinematic landscape.

In addition, the rise of AI in filmmaking raises critical questions about copyright and intellectual property. As AI algorithms become more sophisticated in generating original content, the lines between human creativity and machine-generated work become increasingly blurred, posing challenges for traditional copyright frameworks, which may struggle to accommodate the complexities of AI-generated art. In the same context, questions arise about who holds the rights to

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AI-generated content, whether it be the programmers who developed the algorithms, the filmmakers who input the data and parameters, or the AI system itself, given the limited existing legislation on the matter and the inherent inability of legal systems to enforce copyright law across different distribution media, as well as different parts of the world.

The use of AI in filmmaking also raises ethical concerns about cultural and gender representation: AI algorithms are only as unbiased as the data they are trained on, and if that data reflects the biases and inequalities present in society, the generated content risks perpetuating and amplifying those biases. For instance, if an AI system is trained on a dataset that predominantly features white, male protagonists, it may struggle to generate diverse and inclusive narratives that accurately represent the experiences of marginalised communities. This bias underscores the need for conscious efforts to ensure that the training data used in AI filmmaking systems is diverse, inclusive, and representative of a wide range of cultures, genders, and perspectives. It is crucial for the film industry to actively engage in discussions about the ethical implications of AI and to develop guidelines and best practices that promote fairness, transparency, and accountability in the use of these technologies.

From a conceptual point of view, the use of AI tools in filmmaking also raises questions about the role of human creativity and the essence of artistic expression. As AI algorithms become more adept at generating compelling narratives and visuals, some may argue that it undermines the unique vision and voice of human filmmakers. However, others contend that AI should be viewed as a tool that augments and enhances human creativity, enabling filmmakers to explore new frontiers of storytelling and push the boundaries of what is possible on screen. As the film industry navigates this uncharted territory, it is essential to foster ongoing dialogue and collaboration between filmmakers, technologists, ethicists, and audiences. By engaging in open and transparent discussions about the impact of AI on cinematic realism, representation, and creative expression, we can work towards shaping a future where AI is harnessed as a force for positive change, amplifying diverse voices and perspectives while upholding the fundamental values of artistic integrity and social responsibility. In the following sections, we will delve deeper into specific applications of AI in filmmaking, examining case studies and examples that illustrate both the promises and challenges of this transformative technology. By exploring the intersection of AI and cinematic realism through a critical and nuanced lens, we can gain a deeper understanding of how this powerful tool is reshaping the art of filmmaking and the ways in which it reflects and influences our collective cultural imagination.

The Evolution of Realism in Cinema

Throughout the history of cinema, the pursuit of realism has been a driving force behind technological advancements and creative innovations. To understand the impact of AI on cinematic realism, it is crucial to first define what we mean by 'realism' in the context of film. Film theorists have identified several types of realism in cinema: Bazin (1967:25) emphasised perceptual realism, focusing on the degree to which film's visual and auditory elements match our perception of reality, while Nichols (1991:265) expanded this concept to include narrative realism (the plausibility of the story and characters), emotional realism (the authenticity of portrayed emotions), and social realism (accurate representation of social conditions). In this article, we primarily focus on perceptual realism, while also touching upon narrative and emotional realism as they relate to AI's impact on filmmaking.

In this framework, realism in cinema, particularly in Hollywood, has a long and storied history. Since the 1920s, Hollywood cinema has been characterised by its striving for a particular brand of realism, achieved through specific technical and narrative conventions (Bordwell et al. 1985:33). Three key elements have been central to this approach:

- Continuity editing: A style of film editing that maintains smooth, logical transitions between shots, creating a seamless narrative flow (Reisz & Millar 2010:181).

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- Three-point lighting: A standard method of illuminating a subject from three distinct positions, creating a natural-looking interplay of light and shadow (Brown 2016:499).
- Continuity narratives: Stories that follow a logical, cause-effect structure, often with clear character motivations and resolutions (Bordwell 2006:14).

These techniques have collectively worked to create an illusion of reality, allowing viewers to immerse themselves in the film's world with minimal disruption. The classical Hollywood style, as described by Salt (2009:21), aimed to make the mechanics of filmmaking invisible, enhancing the audience's sense of witnessing real events unfold on screen.

As AI tools have started to have an impact on filmmaking, these established techniques for achieving realism are being both enhanced and challenged. AI technologies are pushing the boundaries of what is possible in visual effects, potentially increasing perceptual realism beyond what traditional methods could achieve (Prince 2012:99). At the same time, AI's capacity for generating narratives and characters raises new questions about the nature of narrative and emotional realism in cinema (Manovich 2018:18). One of the most significant technological advancements in the quest for cinematic realism has been the development of CGI (Computer-Generated Imagery). From the groundbreaking special effects of *Jurassic Park* (Steven Spielberg, 1993) to the photo-realistic environments of *The Jungle Book* (Jon Favreau, 2016), CGI has enabled filmmakers to bring extinct creatures, fantastical landscapes, and futuristic settings to life with unprecedented realism.

The role of technology in enhancing cinematic realism becomes particularly crucial when telling stories set in older or future times. Historical films like *Gladiator* (Ridley Scott, 2000) and *The Aviator* (Martin Scorsese, 2004) exemplify the power of CGI in transporting audiences to ancient Rome and early 20th-century America, respectively. Similarly, science fiction films such as *Blade Runner 2049* (Denis Villeneuve, 2017) and *Interstellar* (Christopher Nolan, 2014) showcase the remarkable ability of CGI to construct breathtaking visions of future cities, space travel, and alien landscapes.

The integration of AI in filmmaking has opened up a wide range of possibilities, enabling filmmakers to push the boundaries of what is achievable on screen. From advanced CGI techniques that blur the line between reality and fantasy to automated scripting tools that generate compelling narratives, AI is transforming the way films are conceptualised, produced, and experienced by audiences (Riedl 2021). In the following sections, we will explore how AI is reshaping these traditional approaches to cinematic realism, examining its impact on visual effects, narrative construction, and the overall filmmaking process. We will consider how AI might enhance our ability to create convincing on-screen realities while also questioning whether it might fundamentally alter our understanding of what constitutes 'realism' in cinema.

The Emergence of Artificial Intelligence in the Film Industry

The integration of Artificial Intelligence (AI) in the film industry has gained significant momentum in recent years, driven by advancements in machine learning, deep learning, and natural language processing (NLP) techniques. AI technologies are being applied across various stages of the filmmaking process, from script development and pre-production to post-production and distribution, transforming the way films are created, analysed, and consumed (Smith & Telang 2016:131). One of the key areas where AI is making a significant impact is in the fields of scriptwriting and story development. AI algorithms, particularly those based on NLP and machine learning, are being used to analyse vast amounts of data from existing scripts, box office results, and audience preferences to generate new story ideas, characters, and plot structures (Goldberg 2019). For example, the AI-powered scriptwriting software "Scriptbook" employs machine learning algorithms to analyse the emotional arc, pacing, and character development of a screenplay, providing writers with quantitative feedback and suggestions for improvement (Scriptbook 2021). Similarly, the "Greenlight Essentials" platform utilises AI to predict the commercial viability of a script based on factors such as genre, target audience, and market trends, aiding studios and producers in making data-driven decisions about project selection (Greenlight Essentials 2021).

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AI is also being applied in the field of pre-visualisation and storyboarding. Advanced Deep Learning algorithms, such as convolutional neural networks (CNNs) and generative adversarial networks (GANs), are being used to generate rough animations and visual mockups based on textual descriptions or concept art (Mirza & Osindero 2014; Goodfellow et al. 2014). These AI-generated pre-visualisations allow filmmakers to experiment with different creative options and refine their visual storytelling before committing to expensive production resources (Silverstein 2019). In the field of visual effects and computer-generated imagery (CGI), AI is enabling the creation of highly realistic and detailed digital assets. Generative models, such as StyleGAN (Karras et al. 2019) and Pix2PixHD (Wang et al. 2018), have demonstrated remarkable ability in generating photorealistic images and videos, including virtual characters, creatures, and environments. These AI-generated visuals can be seamlessly integrated with live-action footage, enhancing the overall realism and immersion of the final product.

However, the use of AI in creative processes raises questions about authorship, ownership, and the potential displacement of human creativity (Anantrasirichai & Bull 2021). There are concerns about job loss and the changing nature of work in the industry as AI technologies become more prevalent and cost-effective (Dornis 2020). Moreover, the use of AI in filmmaking raises issues of bias and representation. AI algorithms are trained on existing datasets, which may contain biases and lack diversity (Zou & Schiebinger 2018). If these biases are not addressed, AI-generated content may perpetuate stereotypes and reinforce existing inequalities (Bolukbasi et al. 2016). It is crucial for the film industry to prioritise the development of AI systems that are transparent, accountable, and grounded in principles of fairness and social responsibility (IEEE 2019).

As the film industry continues to embrace AI technologies, it is important to approach their integration with a critical and nuanced perspective. Ongoing research and collaboration between filmmakers, technologists, ethicists, and policymakers is necessary to develop guidelines and best practices for the responsible and equitable use of AI in filmmaking. By engaging in multidisciplinary dialogue and addressing the ethical, social, and creative implications of AI, the film industry can harness the potential of these technologies to enhance storytelling, audience engagement, and cultural representation while mitigating potential risks and biases.

Impact of AI on Film Production and Post-Production

The integration of Artificial Intelligence in the film industry has revolutionised the way movies are produced and post-produced. AI technologies have significantly streamlined and automated various processes, enabling filmmakers to achieve unprecedented levels of efficiency, creativity, and realism. In this section, we will explore the specific applications of AI in film production and post-production, highlighting their impact on the industry and the benefits they offer.

One of the most prominent areas where AI is making a significant impact is in the realm of visual effects and computer-generated imagery (CGI). Advanced image recognition and synthesis techniques, powered by deep learning algorithms, are enabling the creation of highly realistic and detailed digital assets. Generative models, such as Generative Adversarial Networks (GANs), have demonstrated remarkable ability in generating photorealistic images and videos, including virtual characters, creatures, and environments (Goodfellow et al. 2014). These AI-generated visuals can be seamlessly integrated with live-action footage, enhancing the overall realism and immersion of the final product. For example, the film *Avengers: Endgame* (Anthony Russo, 2019) utilised AI-powered facial recognition technology to digitally recreate the younger versions of actors Robert Downey Jr. and Chris Evans for flashback sequences (Failes 2019). By training deep learning models on extensive datasets of the actors' past performances and appearances, the visual effects team was able to generate highly convincing digital de-aging effects, showcasing the potential of AI in enhancing CGI and visual storytelling.

In the post-production phase, AI is revolutionising the editing and colour grading processes. For example, the AI-powered editing tool "IBM Watson Video Enrichment" uses cognitive computing to automatically analyse video footage, identifying key moments, emotions, and objects, and generating metadata that can assist editors in making more informed creative decisions (IBM 2021). AI can be

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also leveraged in the post-production phase of filmmaking to analyse the emotional tone, pacing, and visual composition of a scene, providing editors with suggestions for optimal cut points, transitions and pacing to enhance the narrative flow and impact (Leake et al. 2017). Another post-production option for AI-assisted technologies is that of colour grading, where dedicated tools can automatically adjust the colour palette and contrast of a shot based on predefined stylistic preferences or reference images, streamlining the colour correction process, and ensuring visual consistency throughout the film. Readily available AI-powered colour grading tools, such as "Colourlab AI", utilise deep learning algorithms to automatically balance colour, contrast, and tone across shots, ensuring visual consistency and artistic intent (Colourlab AI 2021). These tools can significantly reduce the time and effort required for manual colour correction, allowing colourists to focus on more creative and high-level tasks.

Another area where AI is making a significant impact is in the realm of performance capture and digital doubles. Motion capture technology, combined with AI-driven facial recognition and animation, is enabling the creation of highly realistic digital representations of actors (Seymour 2020). These digital doubles can be used for complex action sequences, dangerous stunts, or even to bring deceased actors back to life on screen. In *Furious 7* (James Wan, 2015), the production team utilised AI and CGI to digitally recreate the late actor Paul Walker for certain scenes, seamlessly integrating his likeness into the film after his untimely passing (Failes 2015).

Ethical challenges from the integration of AI in film production and post-production are also present, similarly to what we mentioned above, given that the use of AI-generated visuals and performances raises questions about the authenticity and integrity of the filmmaking process (Anantrasirichai & Bull 2021). There are concerns about the potential overreliance on AI technologies and the erosion of traditional filmmaking craftsmanship. Moreover, the increasing use of AI in the creative process raises ethical questions about authorship, ownership, and the role of human artistry in filmmaking (Dornis 2020). The recent strike of film director, writer, and actor syndicates in Hollywood illustrated the need to act both swiftly and decisively by establishing binding guidelines and best practices that ensure the responsible and transparent use of these technologies.

AI and the Transformation of Cinematic Narratives

The integration of AI in the film industry is not only revolutionising the technical aspects of filmmaking but also transforming the way cinematic narratives are conceptualised, developed, and delivered to audiences. AI technologies are enabling new forms of storytelling, enhancing emotional resonance, and creating personalised viewing experiences that adapt to individual preferences and engagement patterns. In this section, we will explore the impact of AI on cinematic narratives and the potential it holds for the future of storytelling in film.

One of the key areas where AI is transforming cinematic narratives is through data analysis and predictive analytics. By analysing vast amounts of audience data, including viewing habits, preferences, and emotional responses, AI algorithms can provide valuable insights into what elements of a story resonate with viewers (Smith & Telang 2016:162). This information can be used by filmmakers and studios to make data-driven decisions about story development, character arcs, and narrative structures, tailoring their creative process to produce new content to better engage and satisfy their target audiences (Napoli 2021). AI is also enabling the creation of more personalised and interactive narratives through the use of recommendation systems and adaptive storytelling techniques. Streaming platforms like Netflix and Amazon Prime utilise AI algorithms to recommend content to users based on their viewing history and preferences, effectively curating personalised viewing experiences (Gomez-Uribe & Hunt 2016). This level of personalisation not only enhances viewer satisfaction but also opens up new possibilities for crafting narratives that adapt to individual users' tastes and engagement levels. Moreover, AI is being explored as a tool for generating narrative content itself. Generative models, such as GPT-3 (Brown et al. 2020) and DALL-E (Ramesh et al. 2021), have demonstrated remarkable ability in creating coherent and imaginative stories, scripts, and even visual concepts based on textual prompts. While still in the early stages, these AI-generated narratives

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have the potential to serve as inspiration for human writers and filmmakers, offering new ideas and unconventional storytelling approaches.

However, the increasing reliance on AI in shaping cinematic narratives also raises important considerations and challenges. There are concerns about the homogenisation of storytelling, as AI algorithms may prioritise patterns and formulas that have proven successful in the past, potentially stifling creativity and originality (Anantrasirichai & Bull 2021). It is crucial for filmmakers to strike a balance between leveraging AI insights and preserving the human touch and artistic vision that make cinema a unique and powerful medium. Furthermore, the use of AI in narrative generation and personalisation again raises questions about authorship, authenticity, and the role of human creativity in the filmmaking process (Dornis 2020).

Ethical Considerations

While the integration of Artificial Intelligence (AI) in the film industry presents numerous opportunities for innovation and growth, it also raises significant concerns and ethical challenges that must be carefully considered and addressed, as mentioned above. With AI technologies becoming more prevalent and sophisticated in shaping cinematic narratives, production processes, and audience experiences, it is crucial to examine in detail the potential drawbacks and risks associated with their widespread adoption.

One of the primary concerns regarding the use of AI in the film industry is the potential erosion of human creativity and artistic expression as mentioned earlier. As AI algorithms become more adept at analysing data, generating content, and automating various aspects of the filmmaking process, there is a risk that the unique vision and perspective of human creators may be overshadowed or even replaced by machine-generated outputs (Anantrasirichai & Bull 2021). The reliance on AI-driven insights and recommendations may lead to a homogenisation of storytelling, as filmmakers and studios prioritise proven formulas and patterns over innovative and unconventional approaches (Napoli 2021), again pinpointing the need for balance between technology and the human touch.

Another significant concern is the potential for job displacement and the changing nature of work in the film industry. As AI technologies automate various tasks, from scriptwriting and storyboarding to visual effects and post-production, there is a risk that certain roles and skill sets may become obsolete or less valuable (Dornis 2020). This could lead to job losses and a widening skills gap, particularly for those in technical and creative positions that are most susceptible to automation (Flisfeder 2022). Again, it is of utmost importance for the industry to proactively address these challenges by investing in workforce development, promoting collaboration between human and AI talent, and creating new opportunities for individuals to adapt and thrive in an AI-driven landscape.

The use of AI in the film industry also raises important questions about algorithmic bias and the perpetuation of existing inequalities. AI algorithms are only as unbiased as the data they are trained on, and if that data reflects historical and societal biases, the outputs generated by these systems may reinforce and amplify those biases (O'Neil 2016:26). This is particularly concerning in the context of cinematic narratives, as AI-generated content and recommendations may prioritise certain perspectives, experiences, and representations over others, leading to a lack of diversity and inclusivity on screen (Hassler-Forest 2021:13). It is essential for the industry to actively address these issues by ensuring that AI systems are developed and trained using diverse and representative datasets, implementing transparency and accountability measures, and engaging in ongoing critical reflection and dialogue about the social and cultural implications of AI in filmmaking.

As is the case with many fields where AI produces data or processes and classifies existing information, the use of AI in generating and manipulating cinematic content raises profound ethical questions about authenticity, trust, and the blurring of reality and fiction. The increasing sophistication of AI technologies, such as deepfakes and generative models, has made it possible to create highly realistic synthetic media that can be difficult to distinguish from authentic content (Öhman 2021). This presents significant risks in terms of misinformation, propaganda, and the erosion of public trust in media institutions (Westerlund 2019). As AI-generated content becomes

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more prevalent in the film industry, it is crucial to establish clear guidelines and standards for transparency, disclosure, and consent, ensuring that audiences are aware of the nature and origin of the media they consume. In the same context, the integration of AI in the film industry raises concerns about data privacy and the ethical use of personal information. As streaming platforms and studios collect vast amounts of data on audience preferences, viewing habits, and emotional responses, there is a risk of misuse or exploitation of this sensitive information (Zuboff 2019:188). It is essential for the industry to prioritise data protection, implement robust security measures, and adhere to principles of privacy, consent, and transparency in the collection and use of audience data (Anantrasirichai & Bull 2021).

Ultimately, while the integration of AI in the film industry presents significant opportunities for innovation and growth, it also raises profound ethical challenges and potential drawbacks that must be carefully considered and addressed. From the impact on human creativity and job displacement to algorithmic bias and the blurring of reality and fiction, the widespread adoption of AI technologies in filmmaking presents a complex landscape of risks and responsibilities. By engaging in critical reflection, multidisciplinary collaboration, and proactive policymaking, the film industry can work towards harnessing the potential of AI while mitigating its negative consequences, ensuring that the art of cinema continues to serve as a powerful medium for storytelling, cultural expression, and social progress in the age of artificial intelligence.

Conclusions

As AI continues to transform the film industry, it is crucial to consider the long-term implications and potential trajectories of this technological revolution. The integration of AI in filmmaking has already begun to reshape the landscape of cinematic realism, challenging traditional notions of authenticity, creativity, and storytelling. In this paper, we explored the future of cinematic realism in the era of AI, synthesising theoretical analyses and practical applications to envision the possibilities and challenges that lie ahead.

One of the most significant ways in which AI is poised to transform cinematic realism is through the generation of increasingly sophisticated and convincing virtual worlds and characters. Advances in computer graphics, machine learning, and simulation technologies are enabling the creation of highly detailed and immersive digital environments that blur the line between reality and fiction Moreover, AI-powered performance capture and digital doubles are likely to revolutionise the way actors are represented on screen. By combining advanced motion capture technologies with AI-driven facial recognition and animation, filmmakers will be able to create digital performances that are virtually indistinguishable from real actors (Künz et al. 2022), opening up new possibilities for storytelling, while also raising ethical questions about the rights and agency of performers, as well as the potential for deepfakes and other forms of digital manipulation to erode trust in media (Öhman 2021) in the process.

In addition, as AI technologies become more sophisticated in analysing audience preferences and engagement patterns, filmmakers will be able to create adaptive stories that respond to individual viewers' choices and behaviors (Smith & Telang 2016:162), leading to the emergence of new forms of cinematic storytelling, such as branching narratives, procedurally generated plots, and immersive experiences; again, while these developments present exciting opportunities for innovation and audience engagement, they also raise questions about the role of authorial intent and the value of shared cultural experiences in the age of hyper-personalisation.

Finally, the integration of AI in the film industry is likely to have significant implications for the future of cinematic realism in terms of representation and diversity. As AI algorithms play an increasingly prominent role in shaping narratives, casting decisions, and production processes, it is crucial to ensure that these systems are designed and trained to promote inclusivity and counteract historical biases (Hassler-Forest 2021:200). This will require ongoing efforts to diversify datasets, implement transparency and accountability measures, and foster collaboration between AI researchers, filmmakers, and underrepresented communities to create more authentic and equitable representations on screen (Yuen 2021:2002).

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To navigate the complex landscape of cinematic realism in the era of AI, it is essential for the film industry to engage in ongoing theoretical analysis and practical experimentation, possibly including the development of new aesthetic frameworks and critical lenses that can account for the unique properties and challenges of AI-generated content and requiring ethical guidelines to mitigate potential risks. By engaging in interdisciplinary dialogue and collaboration between researchers, practitioners, and audiences, the film industry can work towards a future in which AI technologies are used to enhance rather than replace human creativity and storytelling.

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