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ETHICAL CONSIDERATIONS FOR ANTHROPOMORPHIC CHARACTER PORTRAYAL IN ARTIFICIAL INTELLIGENCE-DRIVEN COMPUTER ANIMATION

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Abstract: This paper addresses the ethical issues involved in the portrayal of anthropomorphic characters in artificial intelligence (AI)-driven computer animation. Drawing from Dr. David Leslie's comprehensive analysis of the potential harms caused by AI systems, six key issues are identified-though they differ somewhat from our findings in the context of animation. This study adopts a phenomenological hermeneutic approach, summarizing the ethical concerns related to the anthropomorphic design of AI-driven animated characters through the analysis of representative films and expert interviews. The key issues include algorithmic discrimination and bias, transparency and deception, the marginalization of human labor through innovation, responsibility and accountability, privacy concerns regarding original creators, and social impact. In response to these issues, we present a framework for the sustainable development of AI in animation. This framework serves as a guide for the responsible use of AI technology in animation, promoting a balance between AI innovation and ethical considerations, while supporting the long-term sustainability of the animation industry.

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Keywords: AI, Computer Animation, Character Anthropomorphization, Ethics

1. INTRODUCTION

AI is becoming increasingly popular in the 21st century, and its powerful problem-solving capabilities are increasingly permeating all levels of computer animation, a technology that is revolutionizing the industry and presenting enormous opportunities (Kazim & Koshiyama, 2021). The anthropomorphic portrayal of animated characters is a task that requires a high degree of creativity, and animation has evolved over the years from traditional hand drawing to computer-based production (Tang & Chen, 2024). In recent years, the emergence of AI has triggered changes in the field of animation. AI's portrayal of anthropomorphic characters has increased the realism of characters, shortened production time, and reduced costs, while also raising a series of ethical issues.

This study is relevant to the theme of the 7th International Conference of Applied and Creative Arts (ICACA): the transformation of AI animation as a creative art is necessary. This study has advanced the ethical improvement of AI-driven animation art. It received guidance and advice from numerous relevant practitioners, educators, and experts. The market-oriented analysis of ethical issues in AI animation aims to establish a sustainable development framework for the anthropomorphization of AI technology in the animation field, providing a moral direction for current practitioners in animation arts.

To fill the research gap in the literature on computer animation, this article aims to achieve three main objectives: (RO1) To explore the application of AI in computer animation, understand its historical background, analyze its potential impact on the animation industry, and examine the development of AI software in the market. (RO2) To investigate the ethical issues of anthropomorphism in AI-driven computer animation using phenomenological hermeneutics. This research method, based on subjective knowledge and the creation of knowledge through subjective experience and insight (Kafle, 2011), helps to explore the perceptions and interpretations of AI animation by animators and audiences. (RO3) To develop a framework for the anthropomorphism of AI computer animation characters, providing a basis for future researchers and practitioners to apply and consider in their work.

This paper explores the ethical considerations of anthropomorphism in AI-driven animated characters and the dimensions of this study, thereby introducing the research questions and laying the groundwork for the following research. The remainder of this article is organized as follows: the second section reviews the relevant literature, the third section explains the research methodology of this study,

the fourth section collects and analyzes the data, the fifth section discusses the research findings, and the sixth section concludes and looks to the future.

2. LITERATURE REVIEW

2.1 AI in Animation

AI animation refers to the use of AI technology to create animations (Sharma, 2023). It leverages data-driven algorithms to achieve the desired effects envisioned by animators. A broad review of the literature has been conducted on the application of AI in the animation field. As early as 1986, Thalmann and Magnenat proposed that AI technology could facilitate intelligent human-computer interfaces in animation, allowing animators to interact with animation systems using natural language (Thalmann & Magnenat-Thalmann, 1986).

With the continuous improvement and enhancement of AI in animation production, generating animations from text is no longer difficult. AI animation generators such as DeepVoxels and Generated Character Animation can create relatively complex animations. Additionally, there are tools for generating animations from doodles. For example, Doodle-to-AI Animation uses neural network systems and deep learning algorithms to create animations through motion recognition technology (Sharma, 2023). These examples show that AI has already penetrated the field of animation creation, providing animators and some creators with ideas and even semi-finished products. Currently, popular AI animation tools include Stable Diffusion, Runway, Common Sense Machines, Mootion, Wonder Studio, Decoherence, Pika Labs, Zero Scope, Kaiber, etc.

2.2 The Anthropomorphism of AI Agents

The anthropomorphism of non-human characters in animation has been widely studied. Human-like qualities, will, emotions, and cognitive agency can foster empathy and emotional connections (Waytz et al., 2010). In the context of AI agents and human relationships, Kim suggests that as human lives become increasingly intertwined with AI systems, understanding how the anthropomorphism of AI agents affects human perceptions is crucial (Kim & Il, 2023). His research indicates that viewers' reactions to anthropomorphism depend on the AI agent's appearance, cognition, and emotional intelligence, enhancing our understanding of human-machine interaction. In this era, the rapid development of AI agent anthropomorphism shows that people are more inclined to approach anthropomorphized AI agents (Pfeuffer,2019). Blut argue that AI mimics human cognitive functions, in which anthropomorphism becomes an important emotional bond (Blut et al., 2021). Stark,

(2024) argues that animated characters take advantage of the human tendency to anthropomorphize to generate two-way communication and empathy with humans.

2.3 Ethical Issues of AI Technology in the Anthropomorphization of Computer Animation Characters

In previous studies, the anthropomorphism of characters has become an indispensable factor for integrating AI into the field of animation. It is used to explain the cognitive factors of interaction and empathy. Therefore, as AI continues to advance in intelligence, the theoretical and practical value of character anthropomorphism in animation will be further explored, and new ethical decision-making dilemmas will continue to emerge. AI ethics encompass their values, morals, and technologies, with the ethical behavior in their development and application adhering to widely accepted standards of right and wrong (Laverty, 2003).

In 2019, Dr. David Leslie from London systematically analyzed the potential harms of AI agents and identified six risks: 1, Bias and discrimination; 2, Erosion of personal autonomy, recourse, and rights; 3, Lack of transparency, explainability, and unreasonable outcomes; 4, Privacy invasion; 5, Social isolation and fragmentation; 6, Unreliable, unsafe, and poor-quality results (Leslie, 2019). Dr. Leslie proposed that all AI projects will have ethical impacts on stakeholders and society, and therefore, future AI projects should be executed based on relevant policy frameworks (Leslie, 2019).

In 2023, Jack Yang's algorithm for studying machine learning (ML) in AI yielded the learning curve shown in Figure 1:

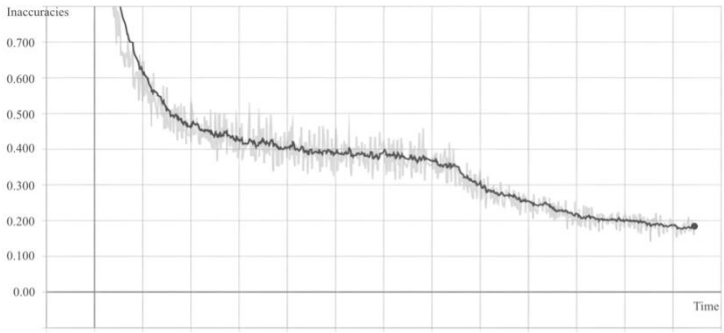

Figure 1. Machine Learning Curves (J. Yang, 2023)

Experiments have shown that although there are slight ups and downs, in the long run, the algorithmic failure problem decreases with time (J. Yang, 2023). AI-driven animation systems can handle animators' needs with increasingly faster algorithms. As theories related to anthropomorphism continue to evolve and AI animation matures, they progressively enhance our ethical responses to AI.

3. METHODOLOGY

This study employs phenomenological hermeneutics, a qualitative research methodology, to examine the ethical implications of anthropomorphic character portrayal in AI-driven computer animation. As espoused by Van Manen, Raquel Ayala and Miguel Martínez, phenomenological research is an experience for the researcher, who must see through the phenomena to the essence (Kafle, 2011). The researcher learns to reflect and experience from the perspective of existing biases and understandings of meaning (Van Manen, 2011).

In this research, a variety of instruments were employed, including content analysis and expert interviews. Content analysis was the primary instrument used to generate data, while expert interviews were utilized to provide additional insights, thus avoiding the potential subjectivity associated with content analysis. This approach proved to be particularly effective in exploring the intricate ethical dimensions of AI in animation.

3.1 Data Collection：

Content Analysis: Analyze representative computer-animated films featuring AI-driven anthropomorphic characters, such as "Toy Story 4," "The Lion King," and "Elemental." Selection criteria include popularity, evaluation of the anthropomorphic characteristics of the characters, and ethical issues related to the use of AI technology in character animation. This analysis aims to identify recurring themes and moral issues in these character portrayals.

Interviews: Semi-structured interviews with computer animators, AI trainers, ethicists, and audience members, with questions focused on the ethical challenges encountered in the creation and portrayal of AI-driven animated anthropomorphic characters.

3.2 Data Analysis：

In 2003, Laverty proposed that data analysis in hermeneutic phenomenology is usually a rigorous application of the hermeneutic cycle consisting of reading, reflective writing, and interpreting, as illustrated below (Laverty):

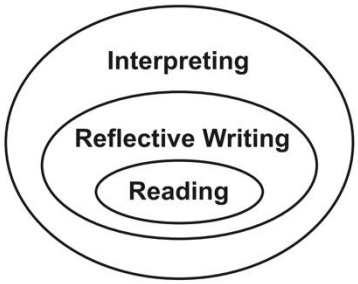

Figure 2. Hermeneutic Cycle (Kafle, 2011)

This study follows Figure 2. The hermeneutic cycle of data analysis involves three stages:

1, Immersion reading: Collecting film data and iteratively reading content and interview transcripts to gain a deep understanding of the material.

2, Reflective writing: The iterative process of coding and categorizing the final themes, avoiding preconceptions and doing reflective work.

3, Interpretation: The researcher interprets the themes in the context of the existing literature and the lived experiences of the participants. This stage involves constructing a coherent narrative that explains the ethical implications of AI-driven anthropomorphic characters' portrayals.

4. DATA FINDINGS AND ANALYSIS

4.1 Content Analysis：

In 2019, Pixar release "Toy Story 4." Since the release of this film, Pixar has used AI deep learning technology—denoising technology as an auxiliary tool—in every one of its animated films.

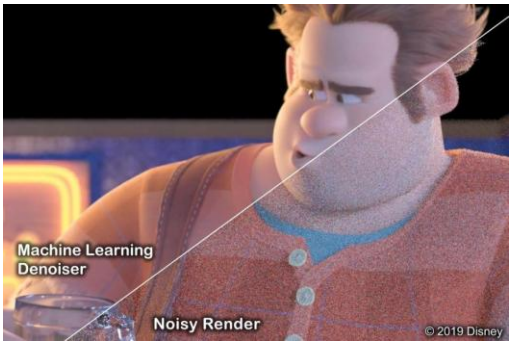

Figure 3. Finish an unfinished rendering simulation with deep learning. ©Disney/Pixar source

Using their past films, Disney has established a dataset (clean images, noisy images) and successfully trained a model that can be effectively applied to other movies. This auxiliary tool greatly enhances the speed and visual effects of characters (Ridge-Institute, 2022).

"Toy Story 4" received a score of 8.3 out of 10 on Rotten Tomatoes. Most people found the character performances aesthetically pleasing and humorous, making it a model of digital artistry. According to the self-consistency theory (L. Li et al., 2024), the anthropomorphism of characters creates an important link to the self-awareness of the audience, without causing the uncanny valley effect, indicating that the characters have a positive impact on the audience. Using AI as an auxiliary tool significantly reduces AI's involvement in a noticeable way. This approach is feasible, but attention should be given to the transparency of AI usage behind the animation, allowing more people to understand this technology.

In 2019, Walt Disney Pictures and Fairview Entertainment co-produced a remake of the 1944 traditional 2D animated film "The Lion King." It has been hailed as a technical marvel in the field of photorealistic animation (Sean Corp, 2020). This animated film was created using CGI, AI, and VR technologies. The animals in the animation are not real, they used AI to control the characters' facial expressions and language movements. Additionally, Disney employed virtual reality technology, with staff wearing HTC Vive VR devices to experience the scenes, determine the composition, and set up the shots (Sean Corp, 2020).

"The Lion King" received a score of 6 out of 10 on Rotten Tomatoes. Some critics feel that there is a lack of novelty, while others even experience discomfort, sensing that the concept of the "uncanny valley" has expanded to encompass animal characters. Excessive enhancement of AI technology and anthropomorphic portrayal of characters in animation might lead to uncanny valley phenomena. AI could replicate animators' preconceived notions and biases, which might result in a loss of creativity (Leslie, 2019).

In 2023, Pixar Animation Studios released an animated film titled "Elemental," which was created using AI. Its director, Peter Sohn, stated that they employed an AI-driven approach called "Neural style transfer" technology, which allows the characters to move like voxels in the animation. Consequently, animators used this AI-assisted technology to achieve perfect effects for flames moving and following (Ahmed, 2023). Once "Neural style transfer" technology is fully utilized, we will use it and then evaluate its ethics. It has been found that using certain machine learning techniques, such as neural network learning, makes it difficult to understand the reasons behind the machine's choices (Brian, 2020). Generally, the more powerful a person or thing becomes, the more transparent it should be otherwise, it can cause a sense of unease.

Figure 4. Neural Style Transfer Techniques Used in The Elements

"Elemental" received a score of 6.4 out of 10 on Rotten Tomatoes. Most people found the anthropomorphic elements in the animation to be detailed and lifelike, indicating that AI-driven computer animation has been positively received by the majority. Some critics noted that while the style is like "Inside Out" and "Zootopia," it lacks the creativity and plot twists of the former. AI might cause animators' creations to lack autonomy and creativity.

Reviews also mentioned, "Unfortunately, the film's handling of important issues such as immigration, cross-racial dating, and discrimination is too harsh and simplistic." Dr. David Leslie has noted that AI technology can lead to algorithmic discrimination and bias (Leslie, 2019). It can replicate, reinforce, and amplify existing social marginalization and inequalities, potentially leading to discriminatory issues for some viewers.

Content analysis summary: The above reveals three recurring ethical issues in AI-driven anthropomorphic characterization:

Algorithmic Discrimination and Bias: AI-driven animation introduces significant uncertainty in the anthropomorphism and design of characters. Some of the animators' preconceived notions may not accurately represent the needs of diverse groups, potentially causing errors or biases in the algorithm. AI can exacerbate social prejudices by over-simplifying or stereotyping certain group characteristics through big data training, thus reinforcing biases against these groups.

Transparency and Deception: The complex algorithms of AI technology can sometimes be difficult to explain concretely. Although certain aspects might be explained, the complexity can lead to a sense of mystery and unease among humans. This can blur the line between virtual and real, potentially deceiving the audience about the true nature of the characters.

Innovation and Marginalization of Human Labor: As AI technology becomes more prevalent in animation, traditional craftsmanship and creative work may be marginalized (Brian, 2020). This shift can affect the employment and motivation of

artistic creators, leading to homogenization and a decrease in innovation in animated works.

4.2 Interviews:

Summary of the interview with a computer animator:

First, the use of AI software has indeed increased efficiency and quality, but it has also led to character depictions becoming increasingly stereotyped, an issue that every animator needs to avoid gradually. Second, AI-driven animation has become highly advanced, sometimes producing results beyond the animator's expectations. This could lead to a lack of creativity, which is why they believe AI should remain a supportive tool rather than replace the core of creative work. Lastly, while AI can be trained to recognize and mimic subtle human emotional expressions, it struggles to fully grasp the deeper emotional layers of characters and the nuanced expression of their background stories. This may affect the audience's visual experience and psychological response. Anthropomorphization involves not only imitating appearance and actions but also expressing a character's inner world.

Summary of the interview with an AI animation (game) trainer:

First, the performance of AI is not solely dependent on data but is also constrained by the design of the training algorithms. Although they strive to prevent biases related to gender, race, etc., when portraying characters, these issues still occasionally occur. Second, AI uses deep learning algorithms to recognize human expressions, movements, language, interactions, or social behaviors and replicate them in animations. However, achieving human-like emotional depth and complexity remains a challenge during training. The "uncanny valley" effect also needs to be considered, as it can impact the audience's psychological response. Third, according to big data statistics, the widespread use of AI has led to the overuse and reuse of content, which could make original or handmade works increasingly rare and valued, possibly turning them into "luxury items." This could also spark disputes between original works and AI-generated content. Finally, the efficiency of AI character training may replace a large amount of manual work, posing a potential unemployment risk for animators. However, this could also lead to the emergence and transformation of new industries.

Summary of the interview with a professor researching AI animation ethics:

Firstly, one of the major difficulties that AI faces is the bias in AI algorithms, a lot of bias and discrimination is caused by the uncertainty of AI production. Second, AI technology is generated from big data, which may lead to the infringement of original creators' rights. Thirdly, there must be reasonable and legitimate accountability

mechanisms in place to ensure that the rapid development of AI is accompanied by an equivalent pace of moral and ethical requirements. Finally, the potential for AI-driven anthropomorphic characters to have an impact on the social behavior and psychology of viewers, including influencing interpersonal relationships and how social interactions are carried out, are potentially hidden issues for the future and must be taken seriously.

Summary of interviews with viewers who have watched computer animation:

A large portion of viewers found AI-generated characters to be very realistic, but some felt they appeared unnatural, especially in the depiction of animal characters. Many still prefer creative, hand-drawn designs. Some viewers were unaware of which characters were AI-generated and felt both curious and uneasy about them. Others even questioned the technology behind training AI characters, asking, "Is it safe?" or "Could it be misused?" Some parents expressed concern about whether AI-driven characters could resonate with children and potentially affect their psychology and behavior.

Summary of interviews:

Through interviews with computer animators, AI trainers, ethics experts, and viewers, we can see that the use of AI technology in creating anthropomorphic characters in animation has sparked a range of viewpoints and reflections.

Computer animators believe that while AI can improve animation efficiency, it can also lead to stereotypical character designs and a decline in creativity. AI trainers emphasize the importance of fairness in data training and algorithm design. They all agree that AI-generated characters lack emotional depth. Ethics experts point out issues such as discrimination, bias, and privacy concerns brought about by AI. Viewers are generally accepting of AI-generated characters but may feel curious and uneasy, with concerns about potential misuse and the impact on children's mental development.

5. DISCUSSION

The application of AI technology in animation production has undoubtedly brought unprecedented innovation and convenience. However, these technological advancements are accompanied by a series of moral and ethical issues. Through the analysis of animated film content and expert interviews, six points have been identified: algorithmic discrimination and bias, transparency and deception, innovation and the marginalization of human labor, issues of responsibility and accountability, privacy concerns of original creators, and societal impact. By comparing these with

the issues raised by Dr. David Leslie regarding AI systems and evaluating other literature, this study has developed a sustainable development framework for the anthropomorphism of AI computer animation characters：

Table 1: Ethical issues and findings on anthropomorphic character portrayal in AI-driven computer animation

issue	Results of the discussion
Algorithmic discrimination and bias	Ensure that the data used in training AI models is diverse and fair. Animation creators should carefully check AI-generated characters or character movements, etc., to avoid unconsciously spreading harmful stereotypes
Transparency and deception	In animation production and promotion, it is important to clearly communicate the AI technology used in character generation to the audience. Increasing the transparency of AI production helps the audience better understand how characters are created, enhancing their ability to discern, especially among children and teenagers. This can prevent any feelings of unease or discomfort that may arise from the mysteriousness of the characters afterward.
Innovativeness and the Marginalization of Human Labor	The importance of human creators in animation creation should be maintained, ensuring that AI is used as a supporting tool, encouraging the integration of AI with the art of transmission animation, and promoting innovation and diversity in the animation industry.
Responsibility and accountability issues	It is essential to define the specific roles and responsibilities of everyone involved in AI-driven animation production to guarantee accountability in the event of any ethical concerns. Furthermore, it is vital to implement effective monitoring and accountability mechanisms for AI to ensure the long-term sustainability of this technology.
Privacy concerns of the originator	In the context of big data, the privacy of the originator is significant. It is therefore essential to ensure that recourse mechanisms against infringement are clearly defined. Furthermore, maintaining transparent usage instructions that explain how the data will be used is crucial for ensuring that the originator has a comprehensive understanding and control over the utilization of the data.
Impact on society	Animation professionals should observe whether the use of AI technology in animation has an impact on viewers' psychology and behaviors and develop strategies to deal with it. Develop appropriate standards and social responsibility guidelines for the use of AI in the industry. Ensure that the use of AI technology in animation is ethical.

Through discussions with computer animators and experts, we realized that the development of AI is an irreversible historical trend. The existing ethical issues must be addressed through the joint participation and supervision of technology developers, animation production companies, the government, and all sectors of society.

6. CONCLUSION

This paper addresses three main objectives: the application of AI in computer animation, the ethical issues of anthropomorphism in AI-driven computer animation characters, and the development of a framework for the anthropomorphism of AI computer animation characters. As times evolve, AI-animated anthropomorphic characters continuously advance in the use of algorithms and models. Machine learning, neural networks, deep learning generative adversarial networks, and fields like image recognition are constantly being updated or even replaced, continuously pushing the boundaries of what animation can achieve. Therefore, the study of AI animation ethics must also continually evolve, as new issues will inevitably arise. The limitations of this study may only represent the ethical issues at the current stage.

In the future, the integration of AI technology and human creativity is an inevitable path in the field of animation. We must maintain a high degree of social responsibility in the application of AI technology to ensure that AI not only advances the industry but also brings positive impacts to society. Addressing the ethical issues in the anthropomorphic portrayal of AI-driven computer animation characters is essential to achieving sustainable development of AI technology in animation. As AI technology continues to update and iterate, ethical standards must keep pace to protect our interests.

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